

THE COST EFFECTIVE REDESIGN OF AN APARTMENT BUILDING  
USING LEED STANDARDS

CREATIVE PROJECT  
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BY

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THE COST EFFECTIVE REDESIGN OF AN  
APARTMENT BUILDING USING LEED  
STANDARDS

## **Chapter 1: Introduction**

In today's modern society there is a growing trend to be environmentally responsible, and to live and work in a healthy environment. Likewise, there has also been a recent trend for individuals and families transitioning from living in single family homes into apartment homes to enjoy a lifestyle with less maintenance and responsibilities, while enjoying more amenities. The problem facing the apartment industry is how to accommodate current residents and future residents when it comes to living an environmentally conscious or "green" lifestyle.

### Leadership in Energy and Environmental Design

One of the green standards for the multifamily housing industry is Leadership in Energy and Environmental Design certification. LEED grants buildings with varying levels of certification based on the number and quality of sustainable and energy efficient products that are used. With growing evidence relative to the importance of green features, the apartment industry has begun to take notice. However, often the initial costs leave market-rate apartments in a lurch.

The purpose of this project is to demonstrate how developers can offset the upfront costs, find quality green products within a set budget, and provide residents with a green interior plan that can reap premium prices.

### The Client

For the purpose of this project the researcher has aligned with a Central Indiana

based property management company, Sheehan Property Management. In order to execute this research, Sheehan has provided a green interior redesign budget of \$5,000. The challenge is to produce a green redesign while staying within the project budget. Factors that affect the budget include initial costs and payback period. The researcher will provide a collection of documents, including Product Guide, Finish Guide, Finish Boards, and Calculation and Budgeting spreadsheets in order to supplement the product findings.

### The Community

Maple Knoll Apartments are located in Westfield, Indiana which is slightly northwest of the capital city of Indianapolis. Maple Knoll opened its doors to residents in June 2008. Sheehan Construction designed, developed and built the structure, while its sister company, Sheehan Property Management, owns and manages the community. Maple Knoll houses 300 units ranging from one, two and three bedroom apartment homes. They offer prospective residents the option of 11 unique floor plans. Maple Knoll currently offers no green amenities or features.

### Statement of Problem

The purpose of this project is to create a sustainable design proposal that will be universally applicable within the apartment industry, but targeted to fulfill the financial resources of Sheehan Property Management. This will be accomplished by researching, comparing, and evaluating green and energy efficient products for Maple Knoll while attempting to stay within the restrictions of a set budget.

### Rationale

Little research has been done on LEED certification; however, according to a study released in 2008 by CoStar Group, LEED certified buildings sell at a 64% premium

and rent at a 36% premium (Ascierto, 2009). Although there are many critics within the apartment industry who do not foresee the benefits of green redesigns or green features, a study conducted by Apartment.com found that more than 60% of prospective residents specifically look for eco-friendly apartments and 25% of those surveyed were willing to pay more for these features (Ascierto, 2009).

A common misconception in the apartment industry is that it is not economically reasonable to redesign an apartment community using green materials and energy efficient products. This research and creative project will provide a Green Finish Guide and Product Guide that industry professionals can use when selecting and determining price points for a green apartment. Simultaneously it will provide industry professionals with evidence that green materials and energy efficient products are obtainable within an established budget.

### Limitations

A major limitation that might arise during the course of this research is not being able to find apartment professionals and vendors willing to provide accurate information on products in bulk. Therefore, the prices on the green materials and products selected are based on the purchase of a single item rather than the volume discount normally provided for a developer in the apartment industry. As a result, the overall costs of the redesign will likely be less expensive than those calculated for this project.

### Assumption

It is assumed that Sheehan is providing the researcher with accurate information for this project. This includes floor plans, measurements, community information, and the budget.

## Definitions

For the purpose of this study it is important that the following definitions are understood in context needed for this creative project.

- **ADA**– “Americans with Disabilities Act Standards for Accessible Design” – sets guidelines for accessibility to places of public accommodation and commercial facilities by individuals with disabilities. These guidelines are to be applied during the design, construction, and alteration of such buildings and facilities to the extent required by regulations issued by Federal agencies, including the Department of Justice, under the Americans with Disabilities Act of 1990. (www.ada.gov, 1994)
- **Benefits** – how a feature satisfies a customer’s need, want and/or desire; emotional appeal (National Apartment Leasing Professional Student Handbook, 2002)
- **BTU**- “British Thermal Unit” - quantity of heat required to raise the temperature of one pound of water from 60° to 61°F at a constant pressure of one atmosphere (www.answer.com, 2006).
- **CFL**- Compact Fluorescent Light
- **Costs** – the additional amount of money that would go into a green design building project verses a conventional building project.
- **Energy Efficiency** – reduction of energy use for a given service (heating, lighting, electronics, etc.) or level of activity. (www.worldenergy.org, 2009)
- **Energy Star Rating** - Products must meet strict energy efficiency guidelines set by the Environmental Protection Agency (EPA) and US Department of Energy.

EPA's ENERGY STAR partnership offers a proven energy management strategy that helps in measuring current energy performance, setting goals, tracking savings, and rewarding improvements. (www.energystar.com, 2009)

- **EPA** – Environmental Protection Agency
- **LEED** – “Leadership in Energy and Environmental Design” is a third party certification program and benchmark for design, construction and operations of high performance green buildings. LEED provides building owners and operators with the tools they need to build a project that is environmentally responsible, profitable and a healthy place to work and live. (www.usgbc.org, 2009)
- **LEED Points** – Points are designed to recognize building performance in five major areas: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Air Quality. Based on the number of points distributed to each area LEED will recognize a project as Gold, Silver or Platinum.
- **Features** – any item about an apartment, community, amenities, neighborhood, or surrounding area regardless of a customer's need, want or desire (National Apartment Leasing Professional, 2002).
- **Gpf**- Gallons Per Flush
- **Gpm**- Gallons Per Minute
- **Green Design** - (also known as sustainable design or eco-design) a design which conforms to environmentally sound principles of building, materials and energy use (www.nkba.com, 2009).
- **kWh**- Kilowatts per hour



- **Needs** – a necessary, must have within an apartment home to feel comfortable and at home.
- **Polyethylene Terephthalate** - PET bottles are sorted, ground into fine chips, and then cleaned. These chips are then melted and extruded into fiber and spun into carpet yarn. Every part of the plastic bottle is recycled, including the cap, the label, and the bottle. The cap and the label are used to make carpet cores around which the carpet is wrapped. These are reused over and over again, unlike cardboard cores that would typically be discarded. The actual bottle is then used to make the PET carpet fiber. (www.mohawk.com, 2009)
- **Residents** – individuals or family members that live in an apartment community and pay monthly rent.
- **VOC**- “Volatile Organic Compound” - are gases or vapors emitted by various solids or liquids, many of which have short and long term adverse health effects.

## **Chapter 2: Literature Review**

With the growing trend in prospective residents seeking eco-friendly or green apartment features, industry professionals are beginning to take notice. Sheehan Property Management has aligned with the researcher in order to compile a green interior redesign proposal based on a \$5,000 budget.

This literature review will examine three factors associated with an environmentally conscious lifestyle and multifamily housing. The topics covered are: 1) Renters' desire for eco-friendly apartment features; 2) Leadership in Energy and Environmental Design (LEED) and certification; (3) and Energy Star.

### Renters' Desire for Eco-friendly Apartment Features

Choosing one's home is a very important and challenging task for homeowners as well as renters. The relationship between an ideal community, based on the personal preferences and wants of the resident, needs to be examined when considering the design of a new or a redesigned apartment community. Thus far, very little research has been done on this topic.

The National Association of Home Builders (NAHB) surveyed 800 consumers, of which 64% of the participants said that "reduced energy cost" would be an importance factor in making decisions about purchasing green homes or remodeling to green standards. The most requested green features on the survey included increased insulation,

tankless water heaters, Energy-Star rated appliances, and air sealing/tight construction. By 2012 sales in green buildings is estimated to increase from \$40 billion to \$70 billion (Ascierto, 2009).

In a recent study conducted by Apartments.com it was discovered that 60% of renters are actively seek out green features, and of that a quarter of them were willing to pay more on a monthly basis in order to have these features within their apartment homes (Ascierto, 2009). Fifty seven percent of renters state their current apartment community does not provide environmentally friendly amenities. Of the 43% of apartment communities that do offer eco-friendly amenities, the following five amenities are the most popular (www.apartmentmanagementinsider.com, 2009):

- On-site recycling programs, at 59% popularity
- Energy efficient light bulbs, at 32% popularity
- Low water-flow devices, at 31% popularity
- Energy efficient windows, at 26% popularity
- Automated and/or paperless processes for online transactions at 24% popularity

### Leadership in Energy and Environmental Design (LEED)

Leadership in Energy and Environmental Design is a product of the U.S. Green Building Council. LEED is a green building rating system designed to encourage green building design and develop practices that are universally understood, and too establish accepted tools and performance criteria (U.S. Green Building Council, 2008). LEED is a third party certification program for the design, construction and operation of high performance green buildings. The three levels of certification are Gold which is the

highest level of certification, Silver and Platinum. The tools are provided to owners and operators to have immediate and measureable impact on their building's performance. Five key areas of human and environmental health are recognized to provide a whole-building approach to sustainability. The key areas include: 1) sustainable site development, 2) water savings, 3) energy efficiency, 4) material selection, and 5) indoor environmental quality (U.S. Green Building Council, 2008).

The LEED rating system was developed by a volunteer committee composed of a diverse group of practitioners and experts in the building and construction industry. There is a large group of professionals that use LEED to transform the built environment to sustainability, including architects, real estate professionals, facility managers, engineers, interior designers, landscape architects, construction managers, lenders and government officials. Not only are LEED projects going on all around the United States but there are also projects in process in 41 countries around the world, including Canada, Brazil, Mexico, and India.

There are both environmental and financial benefits to earning LEED certification including: lower operating costs and increased asset value, reduced waste sent to landfill, conserving energy and water, healthier and safer environment for occupants, reducing harmful greenhouse gas emissions, qualifying for tax rebates, zoning allowances and other incentives in hundred of cities (U.S. Green Building Council, 2008). When it comes to energy efficient buildings, LEED buildings use 18% to 39% less energy "per floor area" than conventional buildings (Birt, 2009)

In order for a building project to become LEED certified the project team must register with the U.S. Green Building Council. It is highly recommended that the project manager receive LEED Accredited Professional certification to demonstrate an understanding of green building principles (Lee, 2009). Registration serves as a

declaration of intent to have the project LEED certified. The LEED project team will have to provide continuous documentation for all stages of the design and construction process. To earn LEED certification, projects must accommodate all prerequisites and earn the minimum amount of points assigned by the LEED rating system. The LEED rating system has seven different categories: New Construction, Existing Building, Commercial Interiors, Core & Shell, School, Health Care and Home. In addition, LEED rating system has two pilot rating systems set to be launched in 2009. Soon LEED for Retail and LEED for Neighborhood Development will be open for registration for certification (U.S. Green Building Council, 2008).

In relationship to this research the relevant rating systems include:

- Existing Building - Operations and Maintenance: focuses on whole-building cleaning and maintenance issues, recycling programs, exterior maintenance programs, and system upgrades. Previously certified projects under LEED for New Construction, Schools, or Core & Shell can apply for Existing Building and Maintenance certification. As of September 1, 2008 all projects registering for LEED Existing Building: O & M must use Version 2.0 (U.S. Green Building Council, 2008).
- Homes: promotes green design and construction of residential homes. The net cost of owning a LEED home is equivalent to owning a conventional home. A green home uses less energy, water and natural resources, creates less waste, and is healthier and more comfortable for the resident. Benefits to having LEED for Home certification is lower energy and water bill, reduced greenhouse gas emission, and less exposure to mold, mildew and other indoor air toxins (U.S. Green Building Council, 2008).

As indicated in the information provided by the U.S. Green Building Council and the LEED certification guidelines, the potential long term benefits for apartment developers are large. This information demonstrates a growing need for green design and it also shows there is a vast community of consumers who find long term value in sustainability even with the initial costs. The upfront costs for LEED for new construction may seem too much, with an estimated cost of 6% to 10% of total budget (Lee, 2009); however, when a cost-benefit analysis is conducted the long term savings could potentially outweigh the introductory costs. Once LEED for Neighborhood Development is fully developed apartment communities as a whole can operate with complete LEED certification. This possibility would greatly benefit apartment owners considering the findings determined by a research study conducted by CoStar Group indicating that a LEED certificated building will sell at a 64% premium (Ascierto, 2009).

### Energy Star

Energy Star is a national standard and internationally known for energy efficient consumer products. Energy Star meets strict energy efficiency guidelines created and regulated by the EPA and the US Department of Energy ([www.energystar.gov](http://www.energystar.gov), 2009). In the United States during 2008, Energy Star saved enough energy to avoid greenhouse gas emission equivalent to 29 million cars, along with saving over \$19 million on utility bills ([www.energystar.gov](http://www.energystar.gov), 2009). The partnership between the EPA and Energy Star offers energy management strategies which help with measuring current energy performance, setting goals, tracking savings and rewarding improvements. Products approved by Energy Star save on average 20% to 30% on energy use.

Energy Star has created a website specifically targeting the needs and resources desirable of apartment professionals. On this site industry professionals can obtain information on energy management programs, multifamily housing fact sheets, free

portfolio manager, building upgrade manual to help identify profitable upgrades, and an Energy Star product data base.

Eight four percent of 4,000 individuals surveyed stated they were influenced to buy a product because of the Energy Star label according to a test conducted by Good Housekeeping Magazine (DeDe Lude, 2009). Currently there are 600 active sponsors of Energy Star programs. Often these sponsors provide rebates to consumers.

Energy Star products lower water and energy cost on individual buildings by 14% to 16%, and 20% to 30% on master-metered buildings (DeDe Lude, 2009). Energy Star CFLs have a payback period of one year, cutting energy consumption by 75% with a bulb lifetime of 7 years, compared to an incandescent bulb lifetime of 11 months. Energy Star washing machines save 45% which is equivalent to \$145 per year ((DeDe Lude, 2009).

### Summary

This literature review examined the three factors associated with the redesign of a green apartment interior. Leadership in Energy and Environmental Design (LEED) promotes global adoption of sustainable green building design and development practices through a rating system leading to certification. Energy Star meets strict energy efficiency guidelines set by EPA and the US Department of Energy that evaluates and rewards consumer products that have an average savings of 20% to 30% of energy.

Renters today are actively seeking eco-friendly features and amenities and a quarter of them are willing to pay higher rent to achieve these features. This research and creative project will supplement the existing body of knowledge related to green design and the apartment industry as well as tie these three factors together by producing a sustainable design proposal that will be universally applicable to all apartment professionals.

### **Chapter 3: Methods**

Gradually the apartment industry is realizing the importance and value in integrating green and energy efficient products into apartment homes. Often the initial construction or redesign costs create an air of hesitation in proceeding with such changes. With the cooperation of Sheehan Property Management, a Central Indiana based property management company, the researcher has been provided a \$5,000 green interior budget in order to present a case that sustainable substitutes are within economic reason. This methodology chapter will document the process the researcher followed to complete the project, as well as describe the challenges that were faced and how they were overcome.

#### Research Process

To complete this project the researcher had to take a variety of steps in order to obtain the accurate information, create a client/researcher relationship and collect, analyze and calculate findings. The following steps were taken to complete this creative project:

1. Researcher – Has a Bachelors of Science degree in Interior Design with minors in Residential Property Management and Marketing. Upon graduating the researcher proceeded into graduate school to study Residential Property Management. The researcher has a passion for green design and the apartment industry.



2. **Contacting the Client** – The researcher approached Sheehan Property Management regarding the collaboration on this creative research project. Prior to the beginning of the project the researcher was aware of Sheehan's growing interest in green design of apartment homes, having completed an internship with the company in 2008.
3. **Establishing Client Needs** - Upon agreement between both parties, a design consultation was conducted which established the client's design needs and financial resources. It was important to Sheehan to be known as the greenest community/management company in the area, to be an energy efficient apartment provider, to have a marketable product, and in to general further their green status. Financially, Sheehan needs the redesign to stay within a \$5,000 interior budget per apartment unit which would increase their current rent by \$83 per month with a payback period of 5 years.
4. **Researching Potential Products** – Once the researcher was aware of the client's needs the product research began. Product research started by researching professional journals, green design reference sites, professional and other external resources. In addition, the researcher attended a professional conference which provided further knowledge on green design in the apartment industry.
5. **Making Contact with Manufacturers and Distributors** – Once the researcher narrowed down the targeted product lines, the attempt to establish contact with distributors was made.
6. **Selecting Products** – Once pricing on several product lines was collected the researcher was able to identify to one product per specific area of interest. This was determined by consumer quality reports, professional journal articles and costs. The researcher did not select the least expensive item in the category,

but selected the product that provided the best benefit and most value within economic reason.

7. Calculating Products into the Budget – The next step was calculating the cost of products that were priced by square footage, i.e. carpet, counters tops, paint. Once cost was calculated per product or material the researcher was able to itemize the products, determining whether or not the selected product were able to fit within the established budget set by the client, Sheehan Property Management.
8. Creating the Product and Finish Guide – After product selection was finalized the researcher was able to create the Product Guide and Finish Guide that features the selected products and materials, including all the information needed to order the specified products as well as images of the product.
9. Designing Finish and Product Boards – Finish Boards provide visual aid in presenting the project to the client and assist in illustrating the overall green redesign. The boards are organized by placing all the new products on one board and all the new finishes on a separate board.
10. Presentation to the Client – during final meeting between the client and designer the researcher has the opportunity to present findings to the client. During this time the researcher will need to convince the client that the design plan is reasonable in terms of time and marketability, and is within the financial means previously established by the client. The client will have the opportunity to ask questions, deliberate, and in the end, decide if they want to proceed with the proposed design plan.

### Research Challenges

With a great deal of the research information needing to be confirmed by the

product vendors, the majority of the challenges associated with this creative project were due to lack of cooperation or responses from these individuals. Therefore, the pricing information that is provided in this project is based on the purchase of a single item rather than in bulk, since pricing for volume discount was not readily available. As a result, a developer would likely receive a lower price quote from their direct vendor, making the green project even more affordable.

## **Chapter 4: Results**

With growing demand for green products and materials in the apartment industry and lack of research, this project was created to act as a template for apartment industry professionals interested in redesigning their communities using sustainable products. The researcher paired up with locally based Central Indiana management company, Sheehan Property Management, with the common goal to create an interior redesign for an existing apartment community. Sheehan set the green interior budget at \$5,000 while clarifying needs, wants and concerns.

The researcher was able to complete a green interior redesign within the confines of a \$5,000 budget. New products and finishes were selected for the following products and finishes: carpet, counter tops, doors, mini blinds, paint, vinyl plank flooring (see Appendix B); dishwasher, refrigerator, washing machine, toilet, shower head, bathroom faucet, kitchen faucet, bathroom vanity light, ceiling fan and light kit, compact fluorescent light bulbs, dining room chandelier, and thermostat (see Appendix C). This chapter will provide information regarding the selection of the products and materials, as well as products omitted from budget. Recommendations are also provided for what products would be included if the budget had permitted it.

### **Selected Products and Materials**

The following products were initially examined and selected based on their Energy Star rating and LEED points. The researcher selected the dishwasher, washing

machine, thermostat and refrigerator based on their Energy Star rating, mid-grade product line status and consumer quality reports. These products are not the least expensive on the market nor are they the most expensive. They fall in the middle and were selected based on quality, brand and consumer ratings. The bathroom vanity light fixture, ceiling fan and light kit, and dining room chandelier were selected based on Energy Star rating, modern style and visual appeal, moderate price and consumer satisfaction ratings.

Energy Star qualified compact fluorescent light bulbs (Appendix C) were selected because on average a consumer can save \$30 over the lifetime of the light bulb. These bulbs will pay for itself within 6 months ([www.energystar.gov](http://www.energystar.gov), 2009). Energy Star CFLs use one-quarter the amount of energy a conventional incandescent light bulb will use while producing the same amount of light and also has a 10 times longer life span ([www.energystar.com](http://www.energystar.com), 2009). Pricing and quantity of CFLs per unit type are listed in Table 2.1 in Appendix F.

The toilet, showerhead, bathroom and kitchen faucets (Appendix C) were selected based on a water savings of 30% compared to a conventional product. Each product has a gpm of 1.75 or below with the toilet meeting strict EPA flush guidelines at 1.28 gpm. Likewise, style and consumer reports were also taken into consideration from a design and functionality perspective.

EcoSLAB counter tops (Appendix B) is a unique and affordable material that is made of 100% recycled glass and porcelain with color pigment epoxy resin. No VOC are emitted from this product and it does not require a seal, making installation effortless ([www.enviroglassproducts.com](http://www.enviroglassproducts.com), 2009). This product is comparable to granite in its beauty, durability and its sustainability. EcoSLAB is suitable for both the kitchen and the bathroom counter tops, due to heat and scratch resistance. ([www.enviroglassproducts.com](http://www.enviroglassproducts.com), 2009).

For the interior doors (Appendix B) the researcher selected a product made from 85% recycled content. Wheatcore doors are a rapidly renewable resource paired with quality veneer. This product has been deemed free of synthetic formaldehyde by an independent laboratory ([www.humabuilt.com](http://www.humabuilt.com), 2009). A particularly low VOC adhesive is used during construction, then ultraviolet rays are used to examine for remaining glue residue. These doors come in a variety of styles, sizes and wood species while leaving a low impact on natural resources. ([www.humabuilt.com](http://www.humabuilt.com), 2009).

Elegant, sophisticated and affordability is the best way to describe the light natural bamboo mini blinds (Appendix C). Manufactured and distributed by Lowes Hardware Store these blinds are inexpensive, accessible and eco-friendly. The horizontal style with a natural finish was selected to brighten up the room and let ample sunlight into the living space ([www.lowes.com](http://www.lowes.com), 2009). These elegant blinds give character to each room while serving a functional purpose.

AMF SafeCoat manufacturer of “Zero VOC” paint products (Appendix B), has been the leading provider for environmentally responsible and non-polluting paint products for 25 years. These paint products reduce emissions that cause indoor air pollution. As a company AMF Safecoat has removed solvents, heavy metals, chemical residues, and formaldehyde from their products ([www.amfsafecoat.com](http://www.amfsafecoat.com), 2007). The researcher has selected a natural almond tone to be used throughout the apartment home. In addition, the researcher has also selected four accent colors (Sandle Tan, Green Pod, Carriage Red, and Memory) that will be used on one wall in the living room, dining room or kitchen. This will serve as a move-in gift from Sheehan from which the resident will be able to pick the color of their choosing before their move-in date.

For design appeal, carpet (Appendix B) was selected to only be used in the bedroom. Not only is this consistent with modern design trend to avoid laying carpet

throughout the entire home, but it will also be cost effective which will later be discussed in more detail in reference to the vinyl plank flooring. The Mohawk carpet from the Aladdin collection is not only attractive and comfortable but it is affordable. Aladdin carpet is composed of Mohawk patented EverStrand fiber which is made from 100% post consumer recycled content. The carpet fibers, polyethylene terephthalate (PET), are extruded from recycled bottles (www.Mohawk.com, 2009). Every single part of the plastic bottle is used during this process. It starts by sorting the bottles, grinding them into small chips, then cleaning. The bottle chips are melted into the PET fiber then spun into yarn. The caps and plastic labels are used to make the carpet-core which is wrapped around the back of the carpet. On average, 30 plastic bottles are recycled to make one square yard of the Aladdin carpet (www.Mohawk.com, 2009). Carpet pricing is established and broken down by unit type in Table 1.2.

Since carpet is only going to be used in the bedrooms for both design and financial purposes, vinyl plank flooring (Appendix B) will be used throughout the rest of the apartment home. This appealing and inexpensive flooring substitute will add value in the resident's eye while being economically affordable for the management company. Innsbruck vinyl planks are composed of 50% to 100% post-consumer recycled content. The planks come in 6" x 36" with 18 pieces per container. The reason this product is so much more economical than carpeting is that carpet needs to be replaced after 4 to 6 years, depending on wear and tear, the management company has to rip up the entire carpet and replace it with new carpet, whether or not the entire carpet needs to be replaced. With the Innsbruck vinyl planks the management company only needs to replace individual plank as needed (www.earthwerks.net, 2009). There is not the daunting task of replacing the whole flooring throughout the entire apartment home. The process is simple: when a plank gets damaged or needs replaced all that is needed is for maintenance to take a hair dryer to the plank, heating it to break down the adhesive

particles, allowing for an easy removal. The next step is applying the low VOC adhesive to glue down a new plank ([www.earthwerks.net](http://www.earthwerks.net), 2009). Since this product is designed to emulate wood, it adds an air of elegance and sophistication to the space.

For complete product and material pricing per unit type refer to Table 3.1 in Appendix G. Reference Appendix F for calculations broken down by individual products and finishes.

#### Omitted Products and Materials

The arena for energy efficient products and sustainable materials is vastly expanding; however, there are some products on the market that are common household items that do not have Energy Star ratings or are not composed of sustainable materials. These products include: clothes dryers, microwaves, ranges, kitchen sinks and bathroom sinks. For this reason, products in these categories were not selected for this project since they do not provide eco-friendly value.

#### Recommendations

Given the confines of a budget there were a couple of products that were left out of the project due to high expense, but are very important when considering a green interior apartment home and LEED certification. The researcher would like to take the opportunity to make recommendations on other products that could be added to a green redesign that would add value to the community and have less impact on the environment, if additional financial resources were available.

Old furnace systems can cause an apartment community or its residents to lose a lot of money unnecessary on utility bills. With the Whirlpool Golf Series 93% furnace energy consumption will be reduced and money will be saved. Green features include: BTU input of 90,000 and Annual Fuel Utilization Efficiency (AFUE) of 93%. Whirlpool



suggests that this product retails at \$1,385.25 ([www.whirlpoolhvac.com](http://www.whirlpoolhvac.com), 2008). On average a 20 year furnace has an AFUE of 60%, the AFUE is the percentage of heat delivered to the home from each unit of fuel. Therefore, with the old furnaces consumers are using 33% more units of fuel than with a newer product ([www.whirlpoolhvac.com](http://www.whirlpoolhvac.com), 2008).

The next green product recommendation would be a solar water heater. With this product energy from the sun is converted into electric power that will heat the hot water tanks in the apartment homes. These solar systems can be installed on the rooftop of buildings or even underground for colder climates. The process is three fold: (1) energy is collected from the sun, (2) the energy is then transferred to circulating water in the form of heat, (3) the solar heated water is then stored in an insulated tank until the hot water is needed ([www.solarroofs.com](http://www.solarroofs.com), 2008). This system can provide 50% to 90% of a consumers hot water needs without using any fuel or polluting the environment. Currently, the federal government is providing a 30% tax credit incentive for all systems installed ([solarroofs.com](http://solarroofs.com), 2008).

The only interior finish that was not included in this project due to high expense is cabinetry. After thorough research of several product lines the researcher would suggest the industry professional purchase sustainable cabinetry from Neil Kelly Cabinets. Neil Kelly's products are LEED certified built with no added urea formaldehyde industrial grade agri-board, which is made from agricultural waste that might otherwise go into landfills. All glues, adhesives and finishes are low VOC. They solely use certified wood veneers from the Forest Stewardship Council ([www.neilkellycabinets.com](http://www.neilkellycabinets.com), 2009). Prices for these cabinets range from \$600 per cabinet up to \$3,900 per unit depending on size and the amount of cabinetry. This pricing information was provided to the researcher directly from Sharon Spackman, a Neil Kelly Cabinets spokeswoman.

## **Chapter 5: Discussion**

The researcher has formed an alliance with Sheehan Property Management in order to create a green redesign template for the apartment industry. In the past couple of years there has been increased attention focused on green features and amenities when prospective residents are looking for a new apartment home. Critics of multifamily housing companies going green believe the cost does not outweigh the benefit. This project is designed to prove that with a set budget of \$5,000 the researcher was able to complete a green redesign for the interior of an existing apartment community. The content of this chapter will focus on the relevance of this project to the apartment industry and how this project will add to the academic body of knowledge regarding Residential Property Management and the apartment industry.

### Relevance of Project

With 60% of prospective residents looking for green amenities when researching apartment homes it is inevitably becoming an important aspect of the multifamily housing industry. Often critics of this movement fail to see how the benefits, along with the residents wants, outweigh the initial cost of the investment. This creative projects aim to demonstrate that with a set budget it is possible to complete a green redesign; this is not to say that some green products are not more expensive than conventional products but that with thorough research a dollar can be stretched a long way and the outcome is a mostly green interior apartment unit. Green products can and often do cost more upfront.

For example a compact fluorescent light bulb costs on average \$2.13 a bulb where an incandescent bulb cost \$0.70; however, with the energy that is saved by using a CFL the light bulb will pay for itself within 6 months. This is what critics fail to recognize.

The relevance of this creative project is to demonstrate how professionals in the industry can take the Products Guide and Finish Guide developed by the researcher and their own budget to create a green redesign of their own apartment building. Any little bit will help the environment as well as help industry professionals reach the eco-friendly target market. A complete green interior redesign would be optimal but costly. These guides will assist industry professionals to pick the products and finishes that will best benefit them, their community and their residents.

#### Addition to Academic Body of Knowledge

With Residential Property Management being a relatively new academic field there is currently very little academic research on this topic. This creative project demonstrates how one can marry the field of interior design and residential property management together. Not only are the two fields closely intertwined but there is still much research that needs to be done related to green design and multifamily housing. With such a small body of knowledge to work from this creative project can act as a foundation for further research in the field of residential property management.

## **Chapter 6: Conclusions and Recommendations**

With the assistance from Sheehan Property Management this project was able to demonstrate to industry professionals that with a set budget and the desire to provide green amenities and features to apartment residents a green redesign is possible. Although the researcher cannot say a complete interior green redesign was accomplished, it can be said that 87% of the products and materials in this apartment redesign are green. The only exceptions being a furnace, solar water heater and sustainable cabinetry. With more interest in green amenities by prospective residents this project stands as a universally applicable sustainable design proposal for the apartment industry.

With minimal academic research regarding green design especially related to the apartment industry, this research stands as a preliminary connection between these fields. Since the apartment industry is a growing academic field this research stands to generate further interest in the hope that more studies will follow in the near future. The researcher strongly believes that research should be conducted on the following green items not related to the interior of an apartment home: insulation, windows and exterior doors, rain water harvest systems, recycling programs and roofing. Creating a knowledge base on these and other apartment components are important to creating a LEED certified green apartment building.

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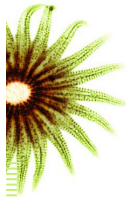
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APPENDIX A:  
CLIENT PROFILE



## Client Profile

Client Name: Sheehan Property Management

Contact Name: Chad Huntsman

Email: [chuntsman@sheehancompanies.com](mailto:chuntsman@sheehancompanies.com)

Address: 6930 Atrium Broadwalk South Suite 100  
Indianapolis, IN 46250

Phone Number: 317-579-9270

Project Name: Maple Knoll Apartments

Property Managers Name: Holly Perry

Email: [hperry@sheehancompanies.com](mailto:hperry@sheehancompanies.com)

Address: 500 Big Leaf Maple Way  
Westfield, IN 46074

Phone Number: 317-896-3130

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Target Market:

- Professionals
- Recent College Graduates starting their careers
- Local employers of Westfield, IN
- Renters looking for the high end status of the product

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Design Needs:

- Energy efficiency
- Overall marketability of a green design

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Design Wants/Preferences:

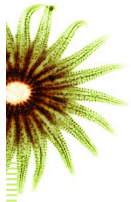
- Further clients green status (i.e. community gardening area, recycling program, carpooling options)
- Being know as the greenest community or management company in the market

---

Project Budget:

- \$5,000 per unit

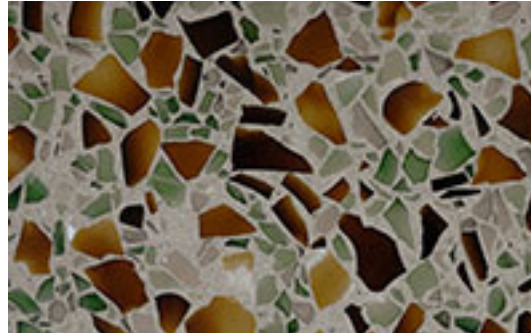
## APPENDIX B: FINISH GUIDE

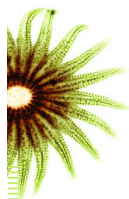


## Finish Guide

### Counter Top

- Name: EnviroSLAB
- Manufacturer: EnviroGLAS
- Manufacturer's Contact Information: 927-608-3790, [www.enviroglasproducts.com](http://www.enviroglasproducts.com)
- Model: None
- Distributor: Contact manufacturer directly
- Distributor's Information: Not applicable
- Price Per 27"x84"x1": \$50
- Energy Star: No
- Green Features:
  - Recycled: 100%
  - LEED Points: 7 or more (NC 2.2/CI 2.0),
- Additional Information:
  - Finish: E-1 Earth
  - Composition: 100% post-use glass, no VOC
  - Available sizes: 27"x84"x1" and 60"x84"x1"
  - Weight: 13 lbs. per square foot



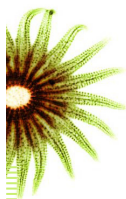


## Finish Guide

### Carpet

- Name: Aladdin
- Manufacturer: Mohawk Flooring
- Manufacturer's Contact Information: [www.mohawkflooring.com/green-flooring/](http://www.mohawkflooring.com/green-flooring/) Model: Not applicable
- Distributor: Contact manufacturer directly
- Distributor's Contact Information: Not Applicable
- Price Per Square Foot: \$1.10
- Energy Star: No
- Green Features: Recycled (100% recycled plastic bottles)
- Additional Information:
  - Composition: carpet fibers made of PET
  - Style: Beretta
  - Color: Chardonnay
  - Available Width: 12 feet wide
  - Construction: Cut Pile
  - Treatment: Scotchgard™ Advanced Repel Technology





# Finish Guide

## Doors

Name: Humabuilt Wheatcore Doors

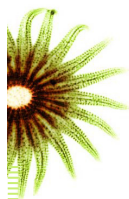
- Manufacturer: Humabuilt Sustainable Technologies
- Manufacturer's Contact Information: 541-488-0931, [www.humabuilt.com/](http://www.humabuilt.com/)
- Model: SL-40
- Distributor: Contact manufacturer directly
- Distributor's Contact Information: Not applicable
- Price: \$78
- Energy Star: No
- Green Features:
  - Recycled: 85%
  - Composition: Wheatcore board, Ultra low VOC adhesives
- Additional Information:
  - Construction: Lag bolt - recessed bolts secure stiles and rails
  - Finish: Red Oak



## Mini Blinds

- Name: 23"W x 64"L Natural Horizontal Blind
- Manufacturer: Allen & Roth
- Manufacturer's Contact Information: 800-445-6937, [www.lowes.com](http://www.lowes.com)
- Model #: BB2364N





## Finish Guide

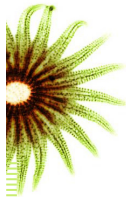
- Distributor: Lowes
- Distributor's Contact Information: 317-484-1600, [www.lowes.com](http://www.lowes.com)
- Price: \$25.96
- Energy Star: No
- Green Features: Bamboo wood
- Additional Information: Natural Finish

### Paint

- Name: Safecoat Eggshell Zero VOC
- Manufacturer: AMF Safecoat
- Manufacturer's Contact Information: 800-239-0321, [www.afmsafecoat.com](http://www.afmsafecoat.com)
- Model (Color): Natural Almond 3011P, Sandle Tan 3023D, Green Pod 3130D, Carriage Red 191A, Memory K94
- Distributor: Building for Health
- Distributor's Contact Information: 800-292-4838, [www.buildingforhealth.com](http://www.buildingforhealth.com)
- Price Per gallon/5 gallon: \$35.90/\$168.90
- Energy Star: No
- Green Features:
  - Composition: Acyclic Copolymer, Water, Titanium Dioxide, Limestone, Aluminum Silicate
  - In-door Air Quality Certificates: Scientific







## Finish Guide

Certification Systems' Indoor Advantage Gold certification, and they satisfy LEED standards

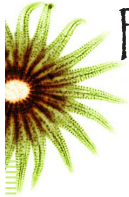
- Additional Information:
  - Coverage: 1 Gallon covers approximately 350 square feet
  - Variety: 900 colors

### Vinyl Plank Flooring

- Name: Innsbruck Plank
- Manufacturer: Earth Werks
- Manufacturer's Contact Information: 800-275-7943, [www.earthwerks.net](http://www.earthwerks.net)
- Model: E1603
- Distributor: Fast Floors
- Distributor's Contact Information: 800-764-1212, [www.fastfloors.com](http://www.fastfloors.com)
- Price Per Square Foot: \$1.72
- Energy Star: No
- Green Features:
  - Recycled: uses a minimum of 20% to 50% post consumer recycled products
- Additional Information: None



APPENDIX C:  
PRODUCT GUIDE



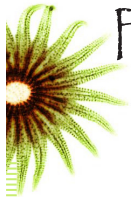
## Product Guide

- Price: \$749
- Energy Star: Yes
- Green Features: Energy efficient
- Additional Information:
  - Total Capacity: 17.6 feet
  - Dimensions: 32-7/8" x 67-7/8" x 28"

### Washing Machine

- Name: 4.5 cu. ft. Capacity (I.E.C.) ENERGY STAR Qualified Cabrio AGI Washer
- Manufacturer: Whirlpool
- Manufacturer's Contact Information: 866-698-2538, [www.whirlpool.com](http://www.whirlpool.com)
- Model: WTW6200S
- Distributor: Contact manufacturer directly
- Distributor's Information: Not applicable
- Price: \$ 799
- Energy Star: Yes
- Green Features:
  - Estimated Yearly Operating Costs: \$23
  - Estimated Yearly Electric Use: 381 kWh
- Additional Information:
  - Capacity: 4.5 cubic square feet
  - Wash Bucket: steel, dual-action agitator that flexes each load through the wash cycle
  - Finish: White





# Product Guide

## Appliances

### Dishwasher

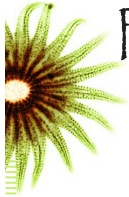
- Name: Black Kenmore 24 in. Dishwasher with SmartWash Cycle
- Manufacturer: Kenmore
- Manufacturer's Contact Information: 1-800-469-4663, [www.kenmore.com](http://www.kenmore.com)
- Model#: 13559
- Distributor: Sears
- Distributor's Information: 317-328-6495, [www.sears.com](http://www.sears.com)
- Price: \$349.88
- Energy Star: Yes
- Green Features:
  - Annual Operating cost for Electric: \$29
  - Annual Operating cost for Gas: \$21
  - Kilowatt Hrs. Per Year: 330
- Additional Information: SmartWash Cycle, weight is 75 lbs



### Refrigerator

- Name: Whirlpool ENERGY STAR Qualified 18 cu. ft. Top Mount Refrigerator
- Manufacturer: Whirlpool
- Manufacturer's Contact Information: 866-698-2538, [www.whirlpool.com](http://www.whirlpool.com)
- Model: W8TXEWFVB
- Distributor: Contact manufacturer directly
- Distributor's Information: Not applicable





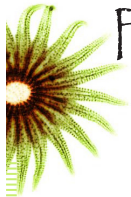
# Product Guide

## Fixtures

### Toilet

- Name: All-in-One Elongated toilet
- Manufacturer: Glacier Bay
- Manufacturer's Contact Information: 800-445-6937, [www.homedepot.com](http://www.homedepot.com)
- Model: 331-725
- Distributor: Home Depot
- Distributor's Information: 317-228-1095, [www.homedepot.com](http://www.homedepot.com)
- Price: \$128.00
- Energy Star: No
- Green Features:
  - gpf: 1.28, Meets strict flushing performance guidelines established by the EPA's WaterSense program
- Additional Information:
  - ADA Accessible
  - Finish: White
  - Dimensions: 28-3/4" x 17-5/8" x 30-3/4"





## Product Guide

### Shower Heads

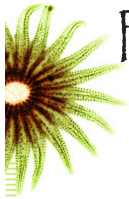
- Name: Forte 1.75 gpm Shower Head
- Manufacturer: Kohler
- Manufacturer's Contact Information: 1-800-456-4537, [www.kohler.com](http://www.kohler.com)
- Model: K-10240
- Distributor: Contact manufacturer directly
- Distributor's Information: Not applicable
- Price: \$84.95
- Energy Star: No
- Green Features:
  - gpm: 1.75
  - Waters Savings: 30% vs. conventional showerhead
- Additional Information: Polished Chrome (CP) Finish



### Bathroom Faucets

- Name: Eva Two-Handle Widespread Lavatory Faucet
- Manufacturer: Moen
- Manufacturer's Contact Information: 1-800-289-6636, [www.moen.com](http://www.moen.com)
- Model: T6420
- Distributor: Home Depot
- Distributor's Information: 317-228-1095, [www.homedepot.com](http://www.homedepot.com)
- Price: \$146.84
- Energy Star: No
- Green Features:
  - Water Efficient: up to 30% water savings





## Product Guide

- WaterSense Label
- Additional Information:
  - Finish: Chrome
  - ADA Accessible

### Kitchen Faucet:

- Name: Collin Water Efficient Single Handle Kitchen Faucet with Spray
- Manufacturer: Delta
- Manufacturer's Contact Information: 800-345-3358, [www.deltafaucet.com](http://www.deltafaucet.com)
- Model: 340-WE-DST
- Distributor: Contact manufacturer directly
- Distributors Information: Not applicable
- Price: \$149
- Energy Star: No
- Green Features: Water Efficient: up to 30% water savings, gpm: 1.5
- Additional Information: Finish: Chrome, ADA: Yes

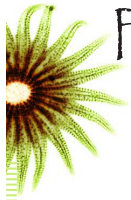


### Light

#### Bathroom Vanity Light

- Name: Medusa 2 Light Vanity Fixture Brushed Nickel
- Manufacturer: Kenroy Home
- Manufacturer's Contact Information: 904-642-4340
- Model: 90212BS
- Distributor: Home Depot
- Distributor's Information: 317-228-1095, [www.homedepot.com](http://www.homedepot.com)





## Product Guide

- Price: \$54.99
- Energy Star: Yes
- Green Features: Energy efficient
- Additional Information:
  - Finish: Chrome
  - Dimensions: 2x100w  
medium base bulb

### Ceiling Fan

- Name: 52" Farmington Ceiling Fan in Brushed Nickel Finish
- Manufacturer: Farmington
- Manufacturer's Contact Information: Unavailable
- Model: B552QI-BN
- Distributor: Home Depot
- Distributor's Information: 317-228-1095, [www.homedepot.com](http://www.homedepot.com)
- Price: \$ 39.97
- Energy Star: Yes
- Green Features: Energy efficient
- Additional Information:
  - Finish: Brushed Nickel
  - Remote: No
  - Reserve: Yes
  - Fan Width: 52"

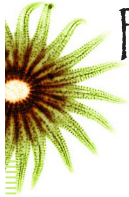


### Compact Fluorescent Lights (CFL)

- Name: GE CFL Light Bulb
- Manufacturer: General Electric
- Manufacturer's Contact Information: 800-848-7620, [www.geappliance.com](http://www.geappliance.com)
- Model: None
- Distributor: Wal-Mart
- Distributor's Information: 317-578-4336, [www.walmart.com](http://www.walmart.com)







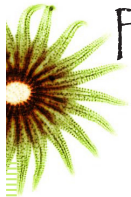
## Product Guide

- Price: \$15.16/for 6
- Energy Star: Yes
- Green Features: Energy efficient
- Additional Information: 26 watt

### Dining Room Chandelier

- Name: Progress Lighting Avalon Collection Brushed Nickel 3-Light Chandelier
- Manufacturer: Progress Lighting
- Manufacturer's Contact Information: 864-678-1000, [www.progresslighting.com](http://www.progresslighting.com)
- Model: P4274-09EBWB
- Distributor: Home Depot
- Distributor's Information: 317-228-1095, [www.homedepot.com](http://www.homedepot.com)
- Price: \$ 119.12
- Energy Star: Yes
- Green Features: Energy efficient
- Additional Information:
  - Glass: Alabaster
  - Finish: Brushed Nickel
  - Dimensions: 21-7/8 In. Diameter x 21-1/2 In. Height
  - Number of Blubs: 3
  - Max Wattage Per Bulb: 13 Watt





## Product Guide

### Light Kit for Ceiling Fan

- Name: Progress Lighting AirPro Brushed Nickel 2-light Ceiling Fan Light
- Manufacturer: Progress Lighting
- Manufacturer's Contact Information: 864-678-1000, [www.progresslighting.com](http://www.progresslighting.com)
- Model: P2612-09
- Distributor: Home Depot
- Distributor's Information: 317-228-1095, [www.homedepot.com](http://www.homedepot.com)
- Price: \$81.72
- Energy Star: Yes
- Green Features: Energy Efficient
- Additional Information:
  - Finish: Brushed Nickel
  - Max Wattage: 13 W.



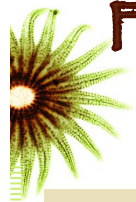
### Other

#### Thermostat

- Name: Basic Programmable Thermostat
- Manufacturer: Honeywell
- Manufacturer's Contact Information: 1-800-328-5111, [www.51honeywell.com](http://www.51honeywell.com)
- Model: RTH221B
- Distributor: Home Depot
- Distributor's Information: 317-228-1095, [www.homedepot.com](http://www.homedepot.com)
- Price: \$24.96
- Energy Star: Yes
- Green Features: Energy Efficient
- Additional Information: None



APPENDIX D:  
FINISH BOARDS



# Finish Board



Interior Paint

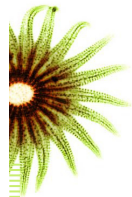


Interior Doors



Bamboo Blind Finish Vinyl Plank Flooring

Recycled Carpet EcoSlab Counter Top



# Product Board

## Lighting



Bathroom Vanity Lights



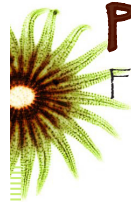
Compact Fluorescent Light



Dining Room Chandelier



Ceiling Fan with Light Kit



# Product Board

Fixtures



Kitchen Faucet



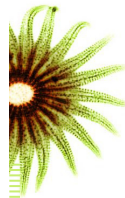
Bathroom Faucet



Showerhead



Toilet



# Product Board

## Appliances



Thermostat



Clothes Washer



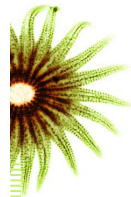
Dishwasher



Refrigerator

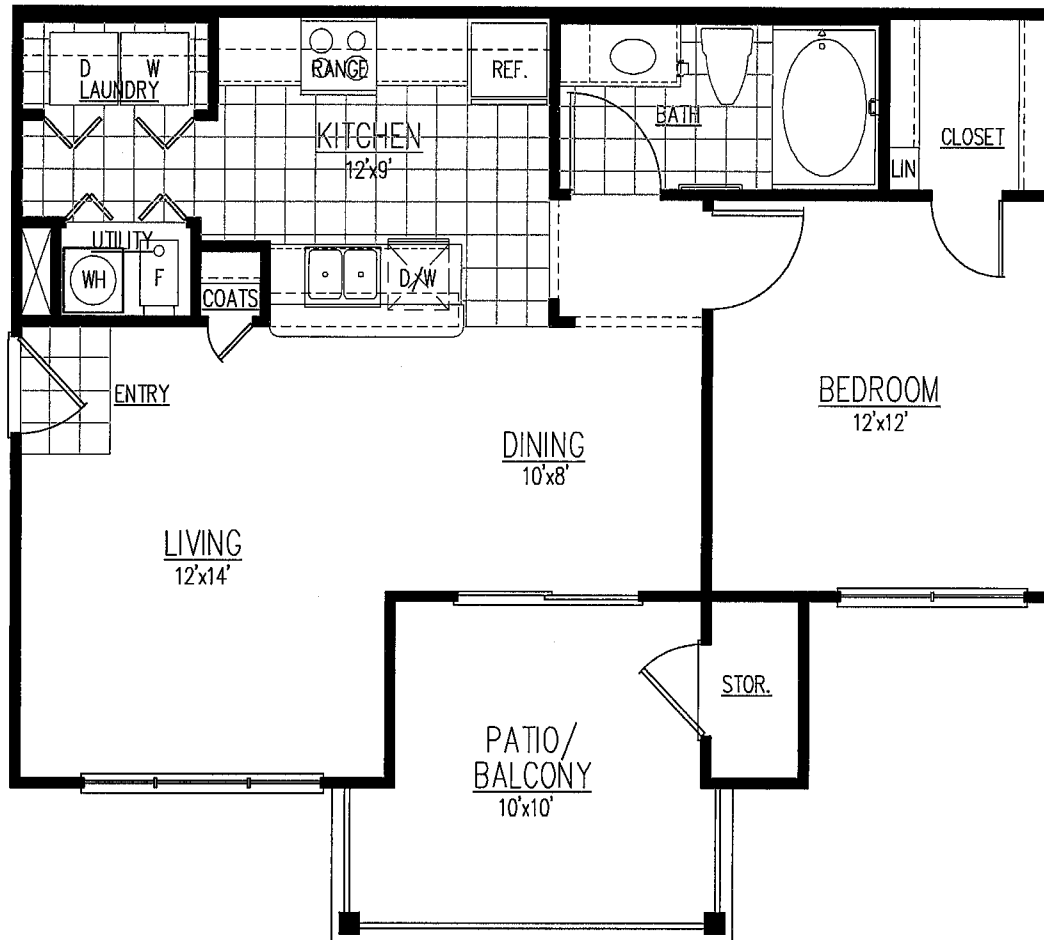
APPENDIX E:  
FLOOR PLANS

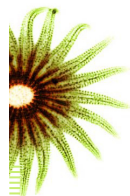




## Floor Plans

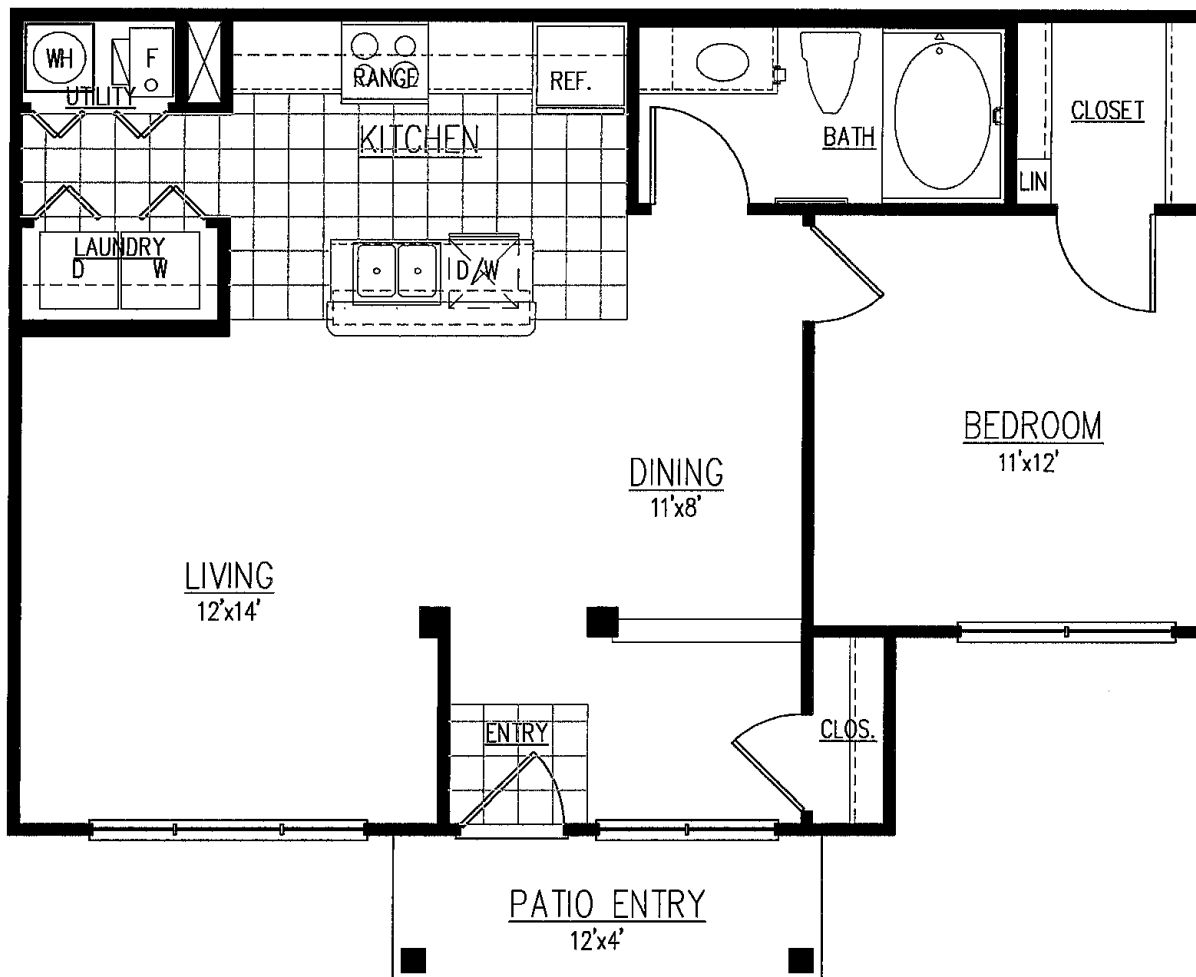
Boxelder - One Bedroom, One Bath - 702 sq. ft.

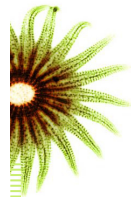




## Floor Plans

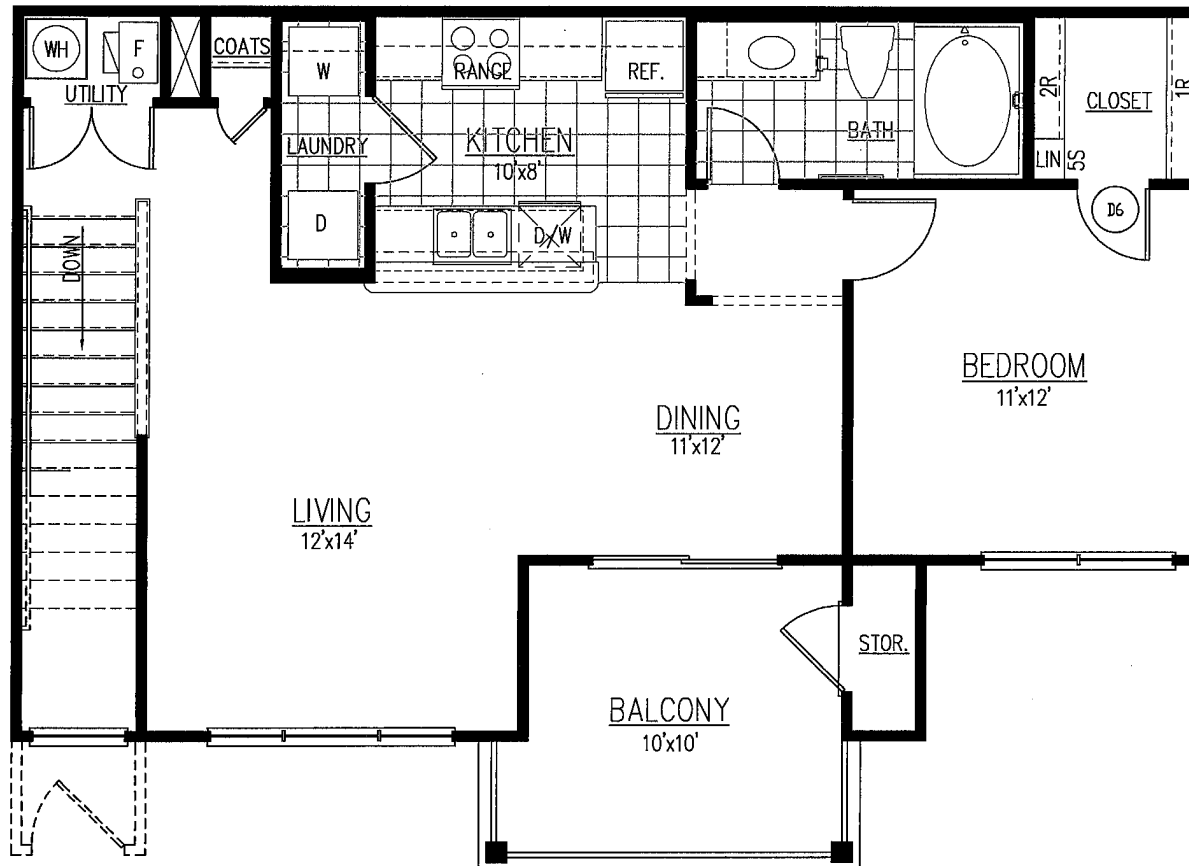
Canyon - One Bedroom, One Bath - 730 sq. ft.

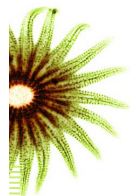




## Floor Plans

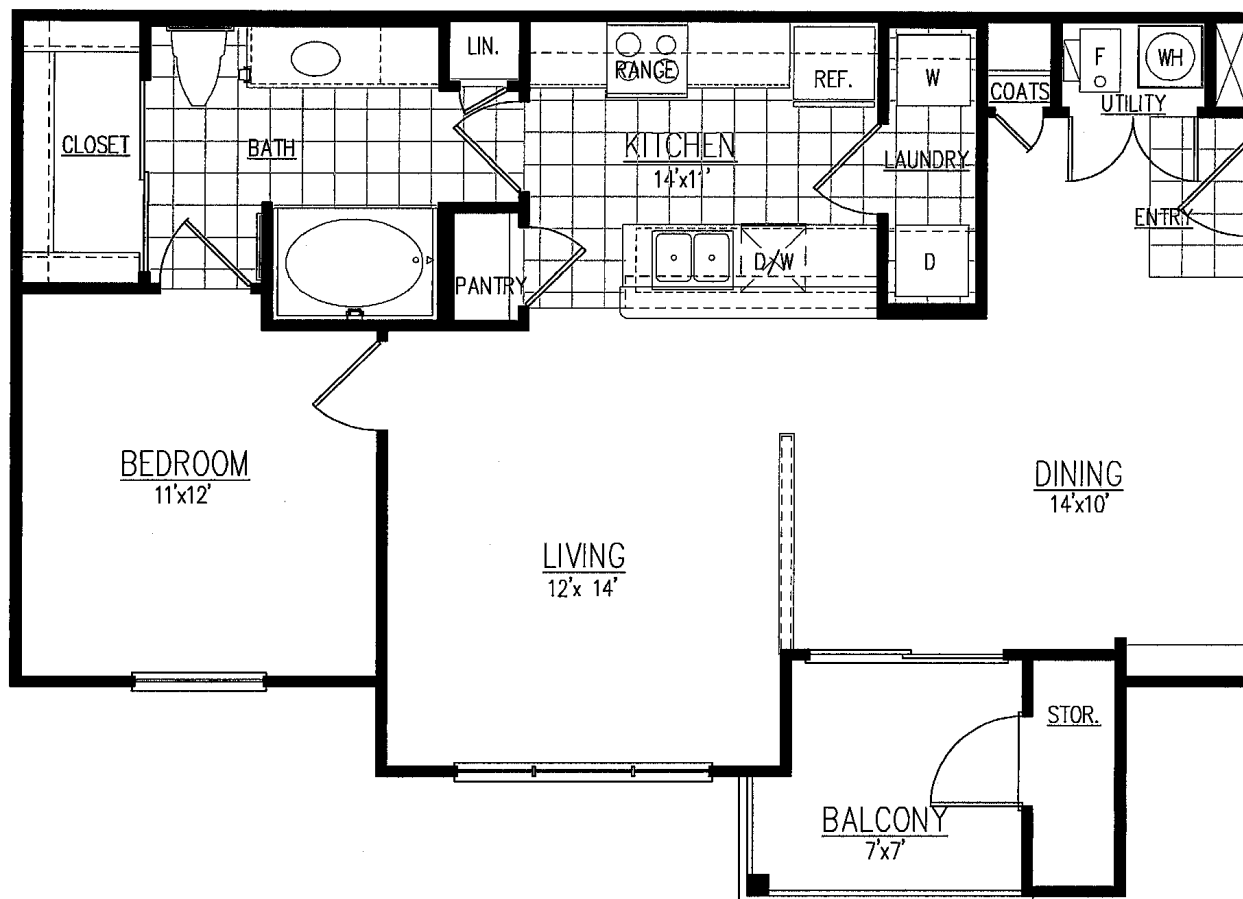
Coral Bark - One Bedroom, One Bath - 776 sq. ft.

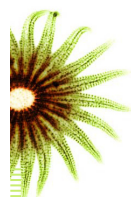




## Floor Plans

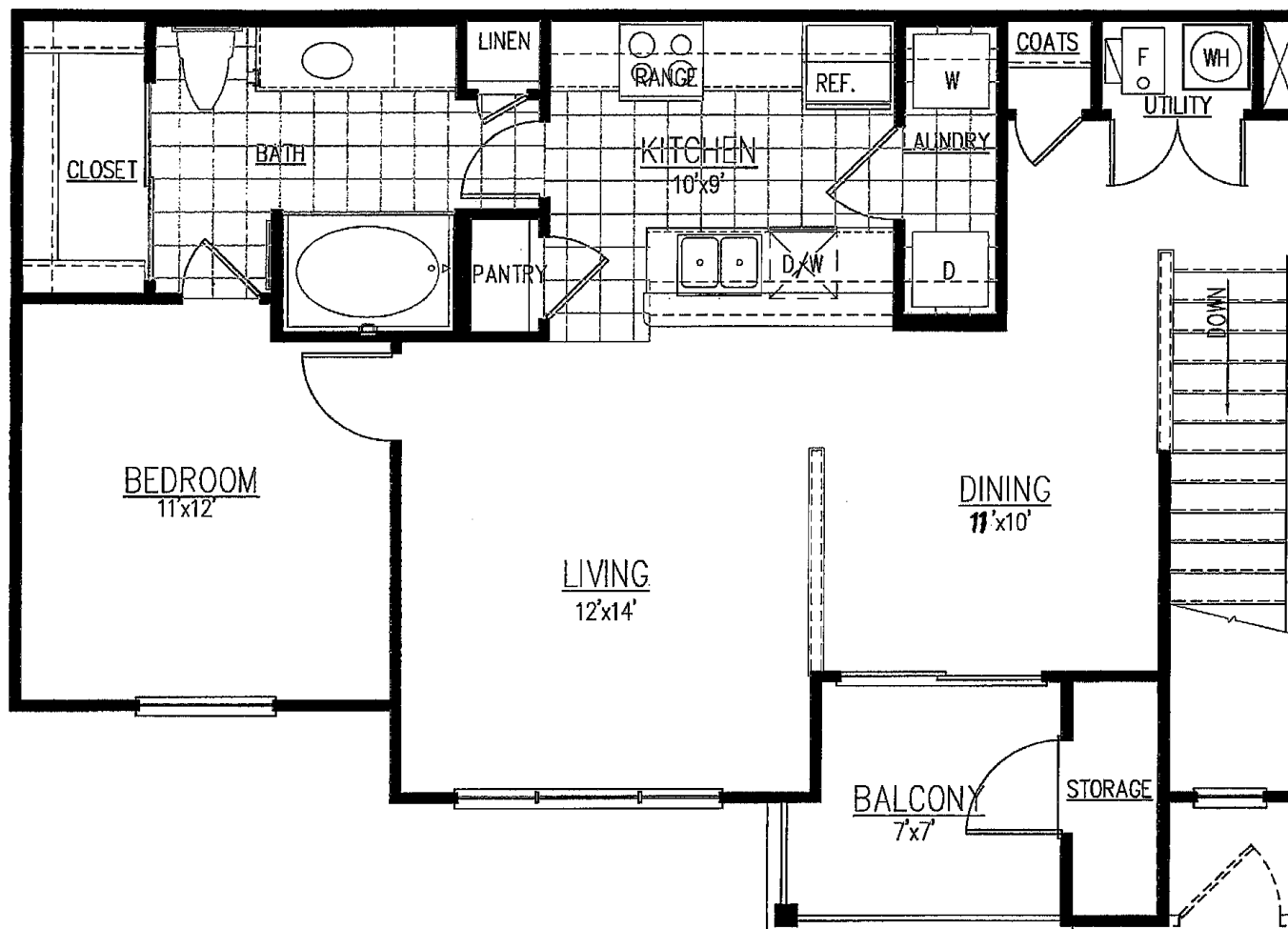
Fernleaf - One Bedroom, One Bath - 834 sq. ft.

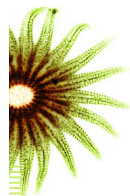




## Floor Plans

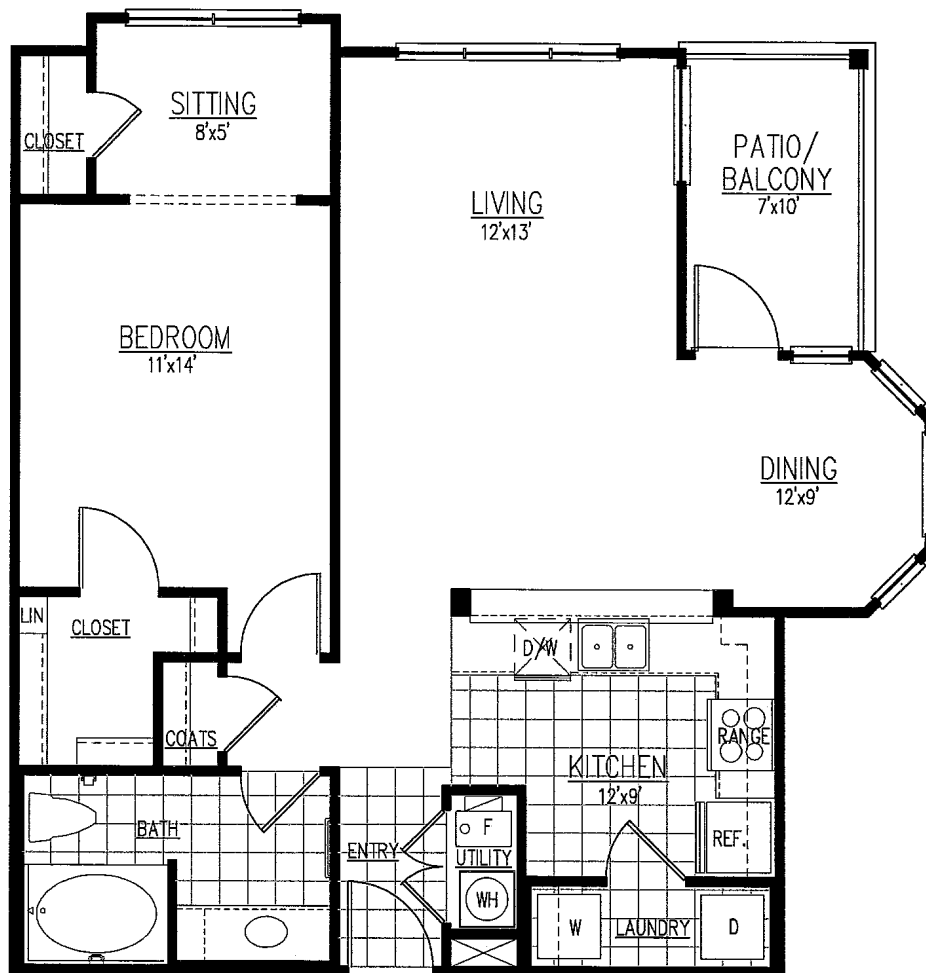
Hawthorn - One Bedroom, One Bath - 790 sq. ft.

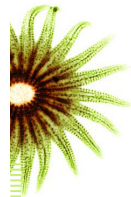




## Floor Plans

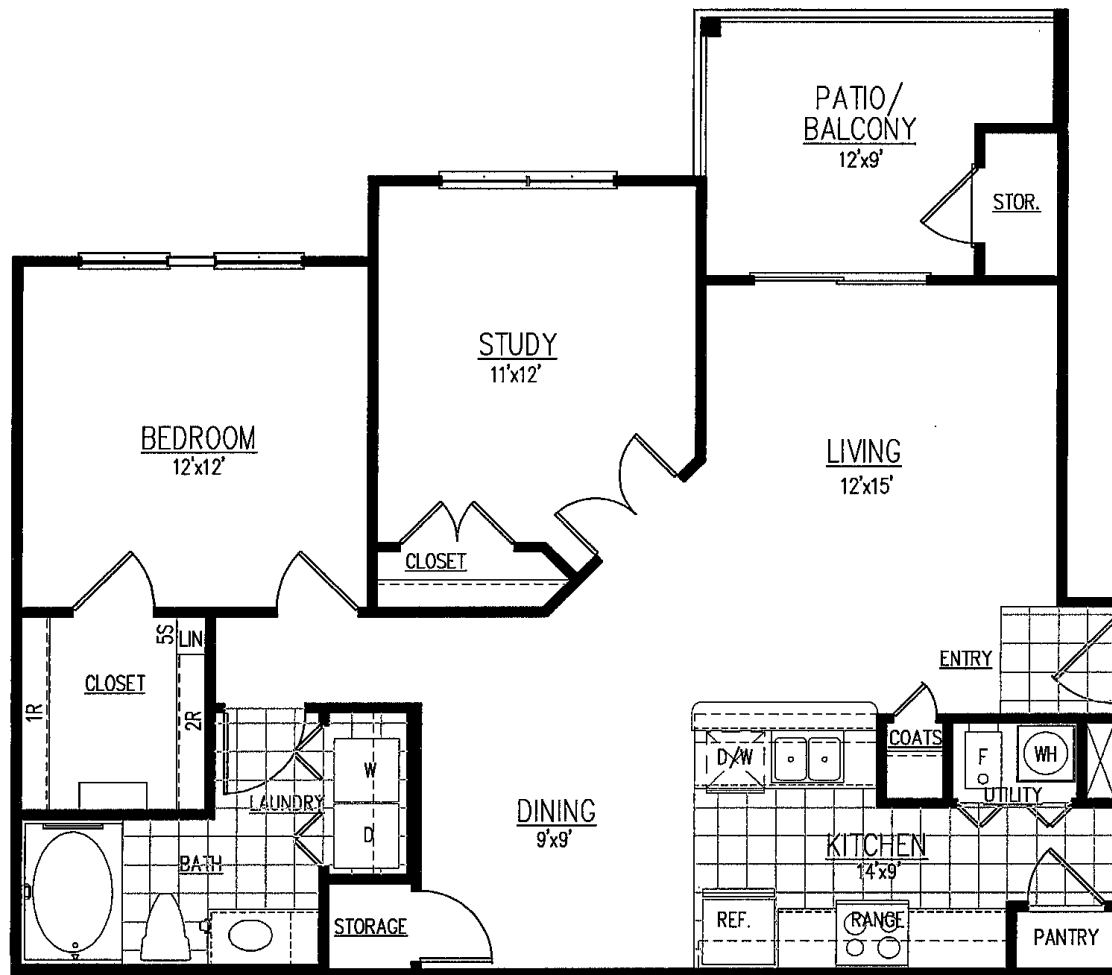
Ivyleaf - One Bedroom, One Bath - 914 sq. ft.

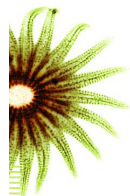




## Floor Plans

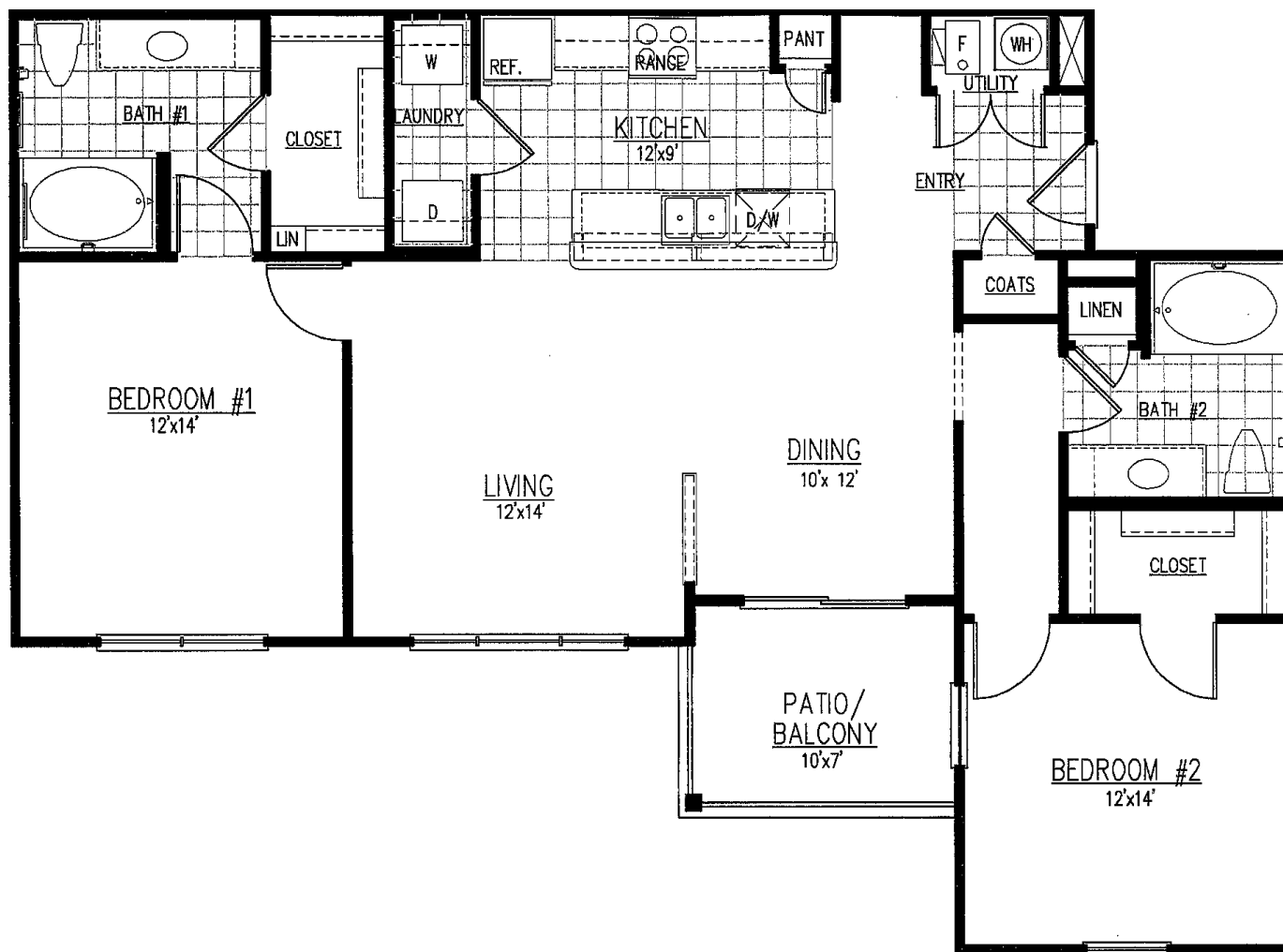
Norway - Two Bedroom, One Bath - 976 sq. ft.



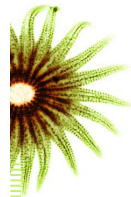


## Floor Plans

Seilbold - Two Bedroom, Two Bath - 1,198 sq. ft.

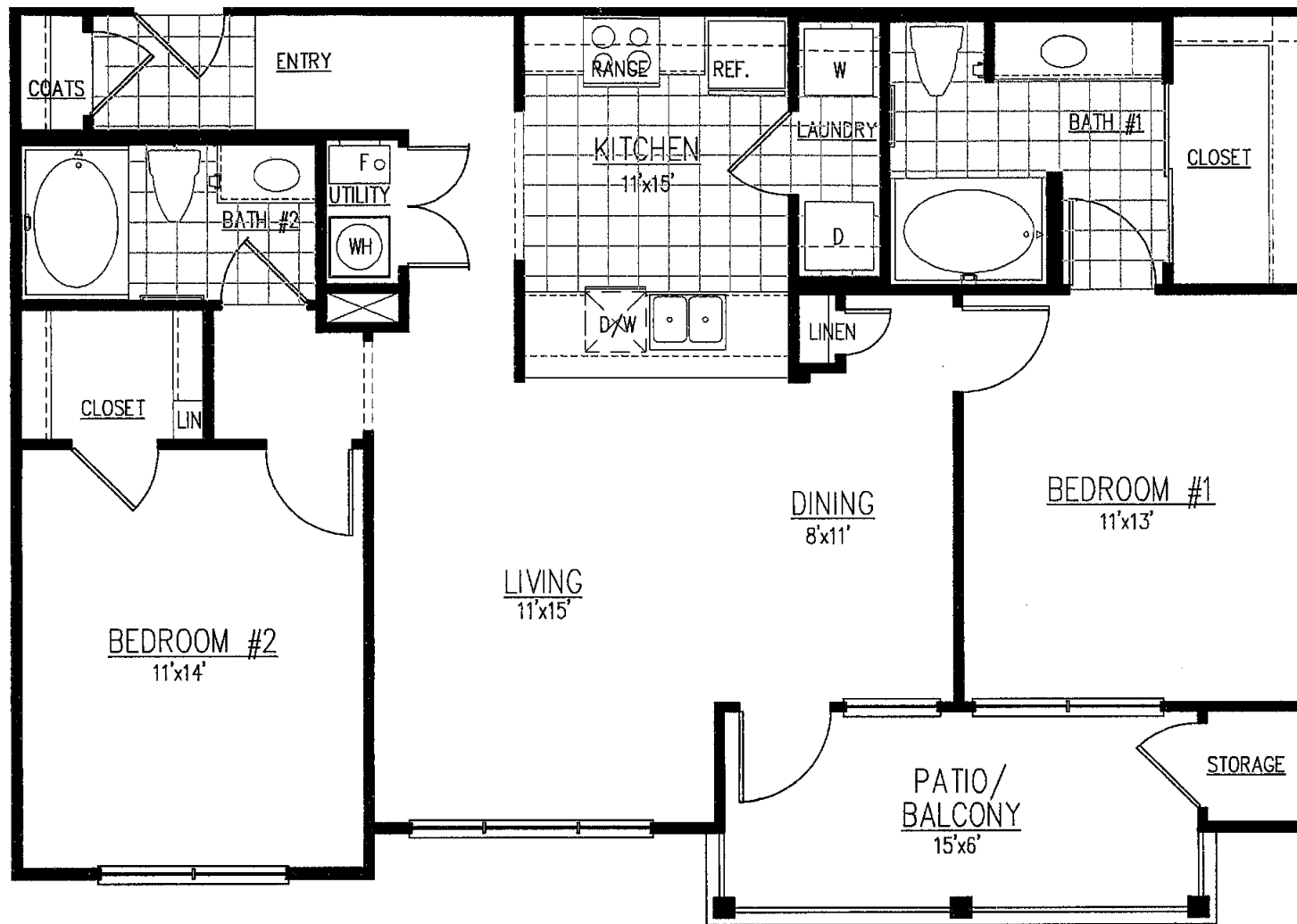


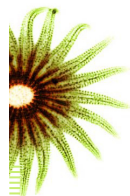




## Floor Plans

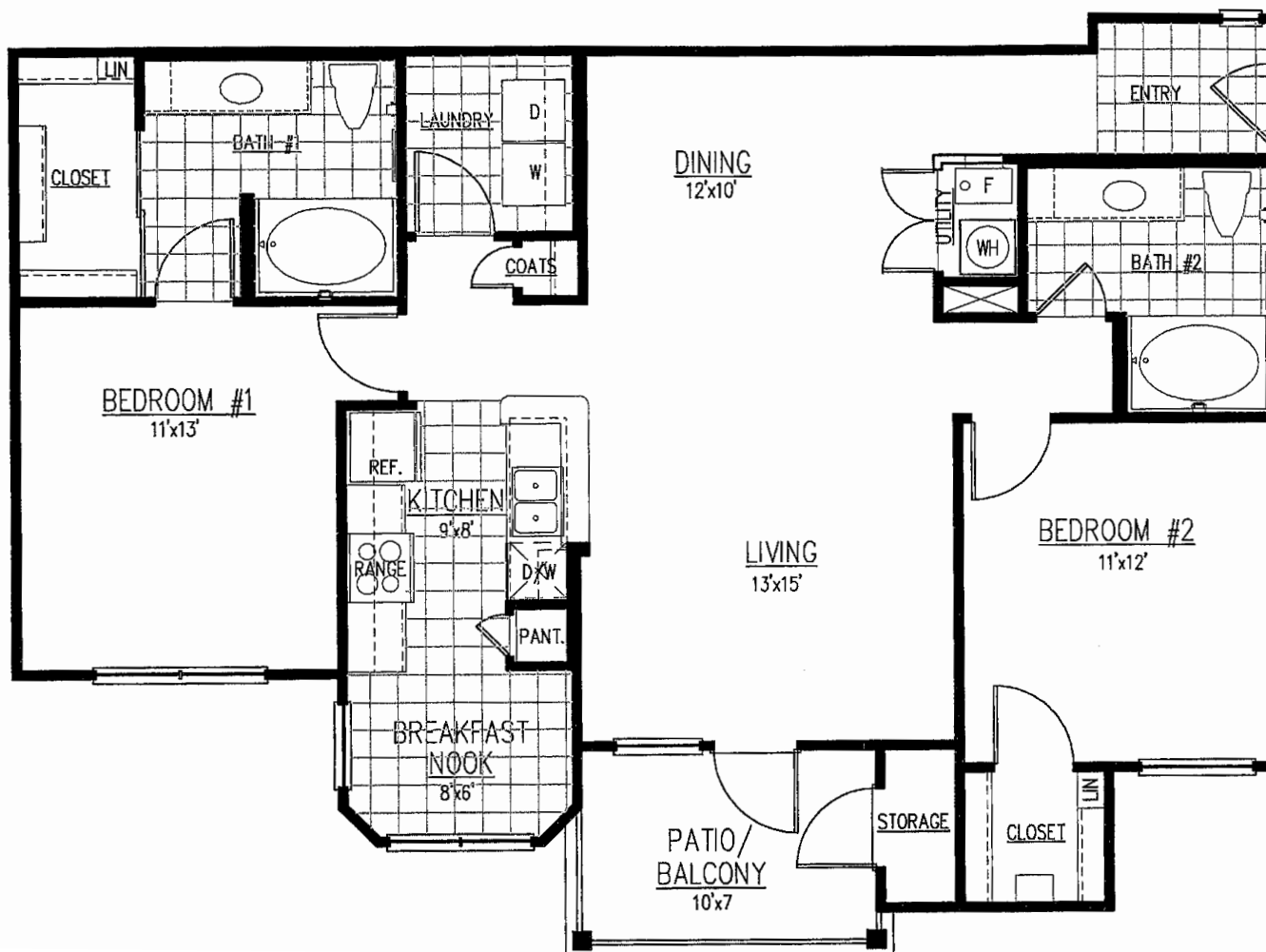
Sugar - Two Bedroom, Two Bath - 1,106 sq. ft.

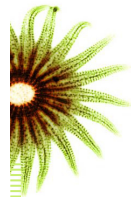




## Floor Plans

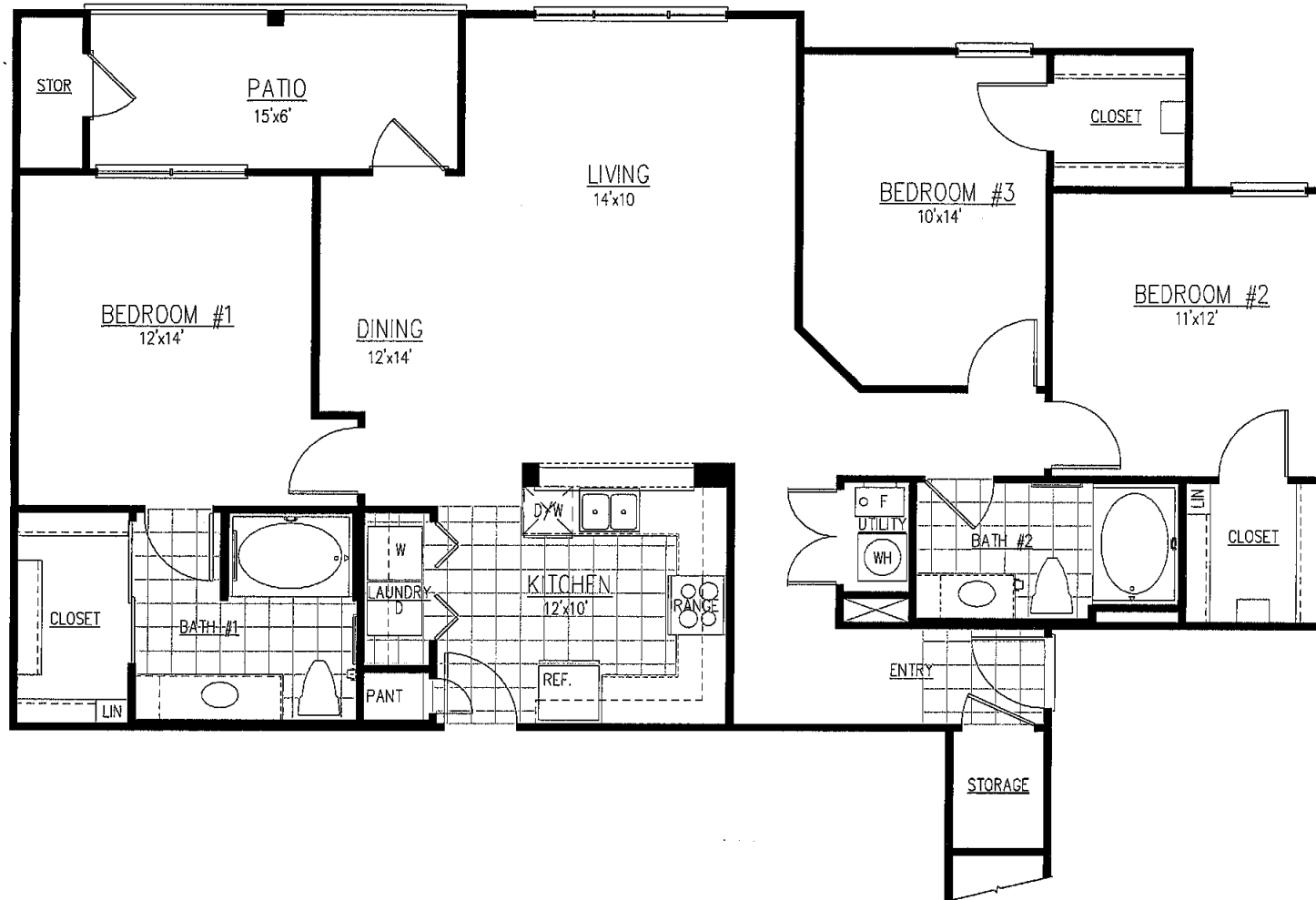
Sycamore - Two Bedroom, Two Bath - 1,198 sq. ft.





## Floor Plans

Threeflower- Three Bedroom, Two Bath - 1,453 sq. ft.



## APPENDIX F: CALCULATIONS

## Finishes

Carpet - Table 1.1

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Finish Quantity</b>	<b>Price (Per Square Foot)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	144 sq. ft.	\$1.10	\$158.40
<b>Canyon</b>	1 bed, 1 bath	730	132 sq. ft.	\$1.10	\$145.20
<b>Coral Bark</b>	1 bed, 1 bath	776	132 sq. ft.	\$1.10	\$145.20
<b>Fernleaf</b>	1 bed, 1 bath	834	132 sq. ft.	\$1.10	\$145.20
<b>Hawthorn</b>	1 bed, 1 bath	790	132 sq. ft.	\$1.10	\$145.20
<b>Ivyleaf</b>	1 bed, 1 bath	914	194 sq. ft.	\$1.10	\$176.36
<b>Norway</b>	2 bed, 1 bath	976	276 sq. ft.	\$1.10	\$303.60
<b>Seibold</b>	2 bed, 2 bath	1198	336 sq. ft.	\$1.10	\$369.60
<b>Sugar</b>	2 bed, 2 bath	1106	297 sq. ft.	\$1.10	\$326.70
<b>Sycamore</b>	2 bed, 2 bath	1198	275 sq. ft.	\$1.10	\$302.50
<b>Threeflower</b>	3 bed, 2 bath	1453	440 sq. ft.	\$1.10	\$400.00

Countertop - Table 1.2

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Finish Quantity</b>	<b>Price (Per Slab Foot)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	2 slabs	\$50	\$100
<b>Canyon</b>	1 bed, 1 bath	730	2 slabs	\$50	\$100
<b>Coral Bark</b>	1 bed, 1 bath	776	2 slabs	\$50	\$100
<b>Fernleaf</b>	1 bed, 1 bath	834	3 slabs	\$50	\$150
<b>Hawthorn</b>	1 bed, 1 bath	790	3 slabs	\$50	\$150
<b>Ivyleaf</b>	1 bed, 1 bath	914	3 slabs	\$50	\$150
<b>Norway</b>	2 bed, 1 bath	976	2 slabs	\$50	\$100
<b>Seibold</b>	2 bed, 2 bath	1198	3 slabs	\$50	\$150
<b>Sugar</b>	2 bed, 2 bath	1106	3 slabs	\$50	\$150
<b>Sycamore</b>	2 bed, 2 bath	1198	4 slabs	\$50	\$200
<b>Threeflower</b>	3 bed, 2 bath	1453	4 slabs	\$50	\$200

Doors - Table 1.3

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Finish Quantity</b>	<b>Price (Per Door)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	3	\$78	\$234
<b>Canyon</b>	1 bed, 1 bath	730	3	\$78	\$234
<b>Coral Bark</b>	1 bed, 1 bath	776	6	\$78	\$468
<b>Fernleaf</b>	1 bed, 1 bath	834	6	\$78	\$468
<b>Hawthorn</b>	1 bed, 1 bath	790	7	\$78	\$546
<b>Ivyleaf</b>	1 bed, 1 bath	914	7	\$78	\$546
<b>Norway</b>	2 bed, 1 bath	976	8	\$78	\$624
<b>Seibold</b>	2 bed, 2 bath	1198	11	\$78	\$858
<b>Sugar</b>	2 bed, 2 bath	1106	9	\$78	\$702
<b>Sycamore</b>	2 bed, 2 bath	1198	8	\$78	\$624
<b>Threeflower</b>	3 bed, 2 bath	1453	9	\$78	\$702

Mini Blinds - Table 1.4

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Finish Quantity</b>	<b>Price (Per Blind)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	5	\$25.96	\$129.80
<b>Canyon</b>	1 bed, 1 bath	730	5	\$25.96	\$129.80
<b>Coral Bark</b>	1 bed, 1 bath	776	5	\$25.96	\$129.80
<b>Fernleaf</b>	1 bed, 1 bath	834	4	\$25.96	\$103.84
<b>Hawthorn</b>	1 bed, 1 bath	790	4	\$25.96	\$103.84
<b>Ivyleaf</b>	1 bed, 1 bath	914	7	\$25.96	\$181.72
<b>Norway</b>	2 bed, 1 bath	976	4	\$25.96	\$103.84
<b>Seibold</b>	2 bed, 2 bath	1198	7	\$25.96	\$181.72
<b>Sugar</b>	2 bed, 2 bath	1106	8	\$25.96	\$207.68
<b>Sycamore</b>	2 bed, 2 bath	1198	8	\$25.96	\$207.68
<b>Threeflower</b>	3 bed, 2 bath	1453	6	\$25.96	\$155.76

Paint– Table 1.5

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Finish Quantity</b>	<b>Price (5 Per Gallon)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	3.5 gal	\$168.90	\$591.15
<b>Canyon</b>	1 bed, 1 bath	730	3.5 gal	\$168.90	\$591.15
<b>Coral Bark</b>	1 bed, 1 bath	776	4 gal	\$168.90	\$675.60
<b>Fernleaf</b>	1 bed, 1 bath	834	4 gal	\$168.90	\$675.60
<b>Hawthorn</b>	1 bed, 1 bath	790	4 gal	\$168.90	\$675.60
<b>Ivyleaf</b>	1 bed, 1 bath	914	4.5 gal	\$168.90	\$760.05
<b>Norway</b>	2 bed, 1 bath	976	5 gal	\$168.90	\$844.50
<b>Seibold</b>	2 bed, 2 bath	1198	6 gal	\$168.90	\$1013.40
<b>Sugar</b>	2 bed, 2 bath	1106	5.5 gal	\$168.90	\$928.95
<b>Sycamore</b>	2 bed, 2 bath	1198	6 gal	\$168.90	\$1013.40
<b>Threeflower</b>	3 bed, 2 bath	1453	7.5 gal	\$168.90	\$1266.75

Vinyl Plank Flooring - Table 1.6

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Finish Quantity</b>	<b>Price (Per Square Foot)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	361 sq. ft.	\$1.67	\$602.87
<b>Canyon</b>	1 bed, 1 bath	730	374 sq. ft.	\$1.67	\$624.58
<b>Coral Bark</b>	1 bed, 1 bath	776	390 sq. ft.	\$1.67	\$651.30
<b>Fernleaf</b>	1 bed, 1 bath	834	487 sq. ft.	\$1.67	\$813.29
<b>Hawthorn</b>	1 bed, 1 bath	790	428 sq. ft.	\$1.67	\$714.76
<b>Ivyleaf</b>	1 bed, 1 bath	914	372 sq. ft.	\$1.67	\$621.24
<b>Norway</b>	2 bed, 1 bath	976	397 sq. ft.	\$1.67	\$662.99
<b>Seibold</b>	2 bed, 2 bath	1198	580 sq. ft.	\$1.67	\$968.60
<b>Sugar</b>	2 bed, 2 bath	1106	365 sq. ft.	\$1.67	\$609.55
<b>Sycamore</b>	2 bed, 2 bath	1198	435 sq. ft.	\$1.67	\$726.45
<b>Threeflower</b>	3 bed, 2 bath	1453	608 sq. ft.	\$1.67	\$1015.36

## Products

Compact Fluorescent Light - Table 2.1

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Quantity</b>	<b>Price (Per Blub)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	6	\$2.53	\$15.16
<b>Canyon</b>	1 bed, 1 bath	730	6	\$2.53	\$15.16
<b>Coral Bark</b>	1 bed, 1 bath	776	6	\$2.53	\$15.16
<b>Fernleaf</b>	1 bed, 1 bath	834	6	\$2.53	\$15.16
<b>Hawthorn</b>	1 bed, 1 bath	790	6	\$2.53	\$15.16
<b>Ivyleaf</b>	1 bed, 1 bath	914	6	\$2.53	\$15.16
<b>Norway</b>	2 bed, 1 bath	976	6	\$2.53	\$15.16
<b>Seibold</b>	2 bed, 2 bath	1198	8	\$2.53	\$20.21
<b>Sugar</b>	2 bed, 2 bath	1106	8	\$2.53	\$20.21
<b>Sycamore</b>	2 bed, 2 bath	1198	8	\$2.53	\$20.21
<b>Threeflower</b>	3 bed, 2 bath	1453	8	\$2.53	\$20.21

Toilet - Table 2.2

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Quantity</b>	<b>Price (Per fixture)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	1	\$120	\$120
<b>Canyon</b>	1 bed, 1 bath	730	1	\$120	\$120
<b>Coral Bark</b>	1 bed, 1 bath	776	1	\$120	\$120
<b>Fernleaf</b>	1 bed, 1 bath	834	1	\$120	\$120
<b>Hawthorn</b>	1 bed, 1 bath	790	1	\$120	\$120
<b>Ivyleaf</b>	1 bed, 1 bath	914	1	\$120	\$120
<b>Norway</b>	2 bed, 1 bath	976	1	\$120	\$120
<b>Seibold</b>	2 bed, 2 bath	1198	2	\$240	\$240
<b>Sugar</b>	2 bed, 2 bath	1106	2	\$240	\$240
<b>Sycamore</b>	2 bed, 2 bath	1198	2	\$240	\$240
<b>Threeflower</b>	3 bed, 2 bath	1453	2	\$240	\$240



Shower Head - Table 2.3

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Quantity</b>	<b>Price (Per fixture)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	1	\$84.95	\$84.95
<b>Canyon</b>	1 bed, 1 bath	730	1	\$84.95	\$84.95
<b>Coral Bark</b>	1 bed, 1 bath	776	1	\$84.95	\$84.95
<b>Fernleaf</b>	1 bed, 1 bath	834	1	\$84.95	\$84.95
<b>Hawthorn</b>	1 bed, 1 bath	790	1	\$84.95	\$84.95
<b>Ivyleaf</b>	1 bed, 1 bath	914	1	\$84.95	\$84.95
<b>Norway</b>	2 bed, 1 bath	976	1	\$84.95	\$84.95
<b>Seibold</b>	2 bed, 2 bath	1198	2	\$84.95	\$179.90
<b>Sugar</b>	2 bed, 2 bath	1106	2	\$84.95	\$179.90
<b>Sycamore</b>	2 bed, 2 bath	1198	2	\$84.95	\$179.90
<b>Threeflower</b>	3 bed, 2 bath	1453	2	\$84.95	\$179.90

Bathroom Faucet - Table 2.4

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Quantity</b>	<b>Price (Per fixture)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	1	\$146.94	\$146.94
<b>Canyon</b>	1 bed, 1 bath	730	1	\$146.94	\$146.94
<b>Coral Bark</b>	1 bed, 1 bath	776	1	\$146.94	\$146.94
<b>Fernleaf</b>	1 bed, 1 bath	834	1	\$146.94	\$146.94
<b>Hawthorn</b>	1 bed, 1 bath	790	1	\$146.94	\$146.94
<b>Ivyleaf</b>	1 bed, 1 bath	914	1	\$146.94	\$146.94
<b>Norway</b>	2 bed, 1 bath	976	1	\$146.94	\$146.94
<b>Seibold</b>	2 bed, 2 bath	1198	2	\$146.94	\$269.68
<b>Sugar</b>	2 bed, 2 bath	1106	2	\$146.94	\$269.68
<b>Sycamore</b>	2 bed, 2 bath	1198	2	\$146.94	\$269.68
<b>Threeflower</b>	3 bed, 2 bath	1453	2	\$146.94	\$269.68

Bathroom Vanity Light - Table 2.5

<b>Floor Plan Name</b>	<b>Unit Type</b>	<b>Square Footage</b>	<b>Quantity</b>	<b>Price (Per fixture)</b>	<b>Total</b>
<b>Boxelder</b>	1 bed, 1 bath	702	1	\$54.99	\$54.99
<b>Canyon</b>	1 bed, 1 bath	730	1	\$54.99	\$54.99
<b>Coral Bark</b>	1 bed, 1 bath	776	1	\$54.99	\$54.99
<b>Fernleaf</b>	1 bed, 1 bath	834	1	\$54.99	\$54.99
<b>Hawthorn</b>	1 bed, 1 bath	790	1	\$54.99	\$54.99
<b>Ivyleaf</b>	1 bed, 1 bath	914	1	\$54.99	\$54.99
<b>Norway</b>	2 bed, 1 bath	976	1	\$54.99	\$54.99
<b>Seilbold</b>	2 bed, 2 bath	1198	2	\$54.99	\$109.98
<b>Sugar</b>	2 bed, 2 bath	1106	2	\$54.99	\$109.98
<b>Sycamore</b>	2 bed, 2 bath	1198	2	\$54.99	\$109.98
<b>Threeflower</b>	3 bed, 2 bath	1453	2	\$54.99	\$109.98

APPENDIX G:  
COST PER UNIT

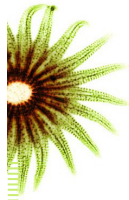
### Cost Per Unit - Table 3.1

[illegible]

Cost Per Unit - Table 3.1 Continued

	<b>Boxelder</b>	<b>Canyon</b>	<b>Coral Bark</b>	<b>Fernleaf</b>	<b>Hawthorn</b>	<b>Ivyleaf</b>	<b>Norway</b>	<b>Seibold</b>	<b>Sugar</b>	<b>Sycamore</b>	<b>Threeflower</b>
<b>Light Kit for Ceiling Fan</b>	\$81.72	\$81.72	\$81.72	\$81.72	\$81.72	\$81.72	\$81.72	\$81.72	\$81.72	\$81.72	\$81.72
<b>Compact Fluorescent Light</b>	\$15.16	\$15.16	\$15.16	\$15.16	\$15.16	\$15.16	\$15.16	\$15.16	\$20.21	\$20.21	\$20.21
<b>Thermostat</b>	\$24.96	\$24.96	\$24.96	\$24.96	\$24.96	\$24.96	\$24.96	\$24.96	\$24.96	\$24.96	\$24.96
<b><i>Total</i></b>	<b><i>\$4,550.81</i></b>	<b><i>\$4,559.32</i></b>	<b><i>\$4,904.49</i></b>	<b><i>\$5,090.52</i></b>	<b><i>\$5,069.99</i></b>	<b><i>\$5,169.96</i></b>	<b><i>\$5,333.52</i></b>	<b><i>\$6,395.81</i></b>	<b><i>\$6,071.30</i></b>	<b><i>\$6,220.63</i></b>	<b><i>\$6,886.29</i></b>

APPENDIX H:  
CONVERSATION LOG



## Conversation Log

January 21, 2009

Chad Huntsman Sent:  
Hi Sara,

I think this will be a great project. Something to consider is initial cost vs. future benefit. This is the focus for us as we present items like this to owners. I would be more interested in the renovation option as retrofitting existing communities is more of a challenge than starting from scratch with a new construction project. There are many green products on the market. Finding the most cost effective options for an existing community is the challenge. It is one thing to pick out the most efficient window and appliance to suggest to an owner, the difficulty is achieving a realistic payback period, making the investment and transition to greener operations cost effective and profitable for the owner. To me, this aspect of your project would be very important – being able to make these changes and move in this direction and still attain financial goals.

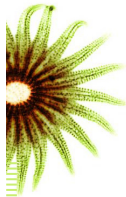
As far as marketing, green design and overall consciousness of the environment is a factor in our industry and all industries. This is the way consumers are moving and the apartment industry needs to embrace these changes and move right along with them. There are small things that can be considered that may add to your project as well. Small plots of land on-site for residents to have a garden, decorative rain bins that can collect rain water to be used for watering flowers, and programs from car pooling to composting can all be options.

I am excited to see your results as this is something I am very interested in.

Let me know if I can be of assistance in any way.

Talk to you soon!

Chad Huntsman  
Director of Property Management  
Sheehan Property Management, Inc.  
317-579-9268 Dire



## Conversation Log

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May 28, 2009

Sara Wehrli Sent:

Chad,

I know you are really busy but I was hoping to get this information from you soon so that I can make some progress on my project.

Budget for MK/RS

Floor Plans (Holly sent me these already)

Needs

Wants/Preferences when it comes to green design

Target Market

Thanks again!!

Sara E. Wehrli, **NALP**

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June 4, 2009

Chad Huntsman Sent:

Hi Sara,

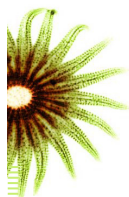
The Maple Knoll budget is attached.

Our target market would be professionals, recent college graduates starting their careers, local employers - Westfield, and an overall renter by choice target due to the high end status of the product.

Our needs would be energy efficiency and overall marketability of a green design.

Our wants / preferences would further our green status such as community gardening areas, recycling programs, carpooling programs, etc. Being known as the greenest





## Conversation Log

apartment community or management company would certainly be a great position to have in the market today.

I am sure we will discuss the details further but hopefully this is enough info to get your project started and see which direction it takes you.

Keep in mind this is still somewhat of a new construction budget so it may look different from what you are used to seeing.

Please let me know any way I can help. I think this will be a very interesting project and very timely as well.

(Maple Knoll budget attached to email)

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June 8, 2009

Sara Wehrli Sent:

Chad,  
Thank you for that information! I was looking over the budget and I can use information off of that but I also need a budget or set dollar amount I need to stay under when redesigning. I guess I am looking for the initial construction budget for Maple Knoll or how much went into building the community. Am I making sense? Sorry!

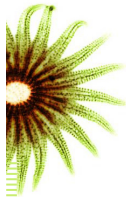
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June 8, 2009

Sara Wehrli Sent:

Chad,

Sorry for two emails in one day but I was just thinking that it might be easier for you to give me a set budget for one apartment unit using green products instead of the whole community. Whichever works out best for you!



## Conversation Log

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June 17, 2009

Chad Huntsman Sent:

Hi Dr. Earhart & Sara,

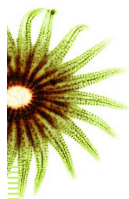
First of all let me apologize for my delayed response. In the last two weeks I have dealt with a flood in Illinois, a hail storm at The Masters that has caused several hundred thousand dollars in damage and the opening of our newest community, River Stone, in Columbus, IN. We also started a massive road construction project at The Masters during this same time frame so I have been spread very thin and my e-mail response has suffered. L

Thank you for the e-mail and your diligence in getting the info you need for your project – I know how important it is. It is difficult for me to provide a budget amount for these improvements without any of the other information from the project available to me such as costs of improvements, payback period, net lease gain from improvements, etc. Is it possible for the project to outline the cost of the improvements, how much we would need to increase the rent to reach a payback period of 3 years, 4 years, 5 years, etc?

It seems like the budget figure should be created through the project in terms of saying “this is how much it will cost to make these changes...” “this is how much we will need to increase the rent to reach a payback period of, for example, 4 years...” and “this is the number of net leases we can gain by making these changes along with decreased energy costs, increased marketability, etc”.

I feel if I just assign a budget figure to stay in line with, without knowing any of the specifics of the project we may not see all of options available and limit the impact. If this project can prove that spending the dollar amount you suggest will provide positive results in conservation, increased NOI, increased marketability, a higher occupancy with less turnover and is financially feasible with a reasonable payback period, the project will be a success.

This is what I think an owner would like to see – a cost / benefit analysis – more that providing a specific dollar figure to stay in line with that will limit your effectiveness.



## Conversation Log

I also understand you may not have this flexibility in your project. If this is the case, I will gladly get off my soapbox and set up a meeting for us to discuss what improvements you are wanting to do and we can collectively come up with a budget amount that will fit.

I hope you both are enjoying the summer and I look forward to talking with you soon!

Sincerely,

Chad Huntsman  
Director of Property Management  
Sheehan Property Management, Inc.  
317-579-9268 Direct  
317-579-9270 Main  
317-579-9271 Fax  
[www.sheehancompanies.com](http://www.sheehancompanies.com)

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June 23, 2009

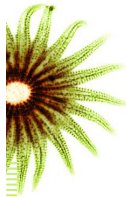
Chad Huntsmen Sent:

Dr. Earhart & Sara,

Thank you for the response. If we were to spend \$3,000 per unit we would have to increase the rent by \$83 per unit per month in order to achieve a payback period of 3 years. Hopefully with an exciting "green" marketing campaign and an overall utility savings and conservation approach we could achieve a rental increase such as this. This would definitely price us at the top of the market, but we would be able to add real value to our community using the green approach.

Folks are spending more money on a hybrid vehicle in order to save money on gas and be friendlier to the environment – we should be able to achieve the same thing.

If you are able to spend less than the \$3,000 per unit - great. We could also adjust the payback period to as much as 5 years if we determine the market will not hold such a



## Conversation Log

large rental increase.

I hope this helps – let's talk further either way. J

Talk to you soon!

**Chad Huntsman**

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June 24, 2009

Sara Wehrli Sent:

Chad,

I was going over my numbers and I was wondering if you considered a water heater and furnace as part of an interior budget. I have researched and found great energy efficient products however it would be hard to included these items into a \$3,000 budget. Dr. Earhart wanted me to ask you if you thought those items should be included in the interior budget or would those be in the exterior/structural/mechanical part that I am not focusing on.

Sara E. Wehrli, NALP  
Graduate Assistant  
Ball State University  
Residential Property Management

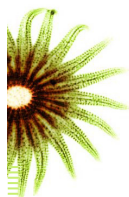
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June 29, 2009

Hi Sara,

I would think they would be included. If you include them how much are you over budget?

Chad Huntsman



## Conversation Log

Director of Property Management  
Sheehan Property Management, Inc.  
317-579-9268 Direct  
317-579-9270 Main  
317-579-9271 Fax

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June 30, 2009

Sara Wehrli Sent:

Hey Chad,

I haven't calculated everything completely yet but the furnace alone is \$1,385 and the water heater is \$588. I can fit them into the budget if I don't include items that are not energy efficient or green materials (i.e. microwaves, dryers, etc) but if I don't include those then it also wouldn't be a complete interior redesign. I will work the numbers for and search other products and see what I can figure out!

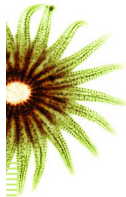
How are things with you? I hear there are a lot of changes going on at Sheehan. That is very exciting!

Sara E. Wehrli, NALP  
Graduate Assistant  
Ball State University  
Residential Property Management

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June 30, 2009

Chad Huntsman Sent:



## Conversation Log

Hi Sara,

Things are going well - very busy!!!! Thanks for asking. Let me know where you end up budget wise with what you would prefer to do. Based on where that number falls we may have some room especially if we extend the payback period.

I hope you are enjoying your summer - I know you are excited to wrap this project up!

Let me know if I can help in any way.

Talk to you soon!

Chad Huntsman  
Director of Property Management  
Sheehan Property Management, Inc.  
317-579-9268 Direct  
317-579-9270 Main  
317-579-9271 Fax



July 6, 2009

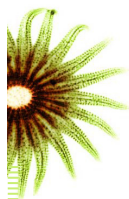
Sara Wehrli Sent:

Hey Chad,

I wanted to send you what I have completed so far on the project. I am getting down to the wire and I wanted to see what you thought about the products I have select and the budget. I have attached:

Product Calculation  
Price per unit Calculations  
Finish Guide  
Product Guide

Included in the redesign I have selected products that are not energy efficient (i.e.



## Conversation Log

dryers, microwaves, etc.) which has made the budget increase substantially. As it stands right now I don't see a way to do a complete green interior redesign with a \$3,000 budget. So once you look over the information I am sending let me know what angle you think I should take. Should I state in my paper that I was not able to complete the redesign within the \$3,000 budget or maybe we can increase the budget slightly? Let me know what you think. I have to have this sent to Dr. Earhart and Dr. Spangler tomorrow evening for approval.

Sara E. Wehrli, NALP  
Graduate Assistant  
Ball State University  
Residential Property Management

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July 6, 2009

Chad Huntsman Sent:

Hi Sara,

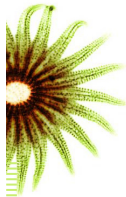
I think the angle to take is to include the products that will make a difference with energy conservation. For instance...

The recycled carpet is very cool but we would not replace current new carpet with recycled carpet. Once we were at timeframe to replace carpet from wear and tear then we would consider this but for your project the way it stands now I would focus on the items that will make an immediate difference.

Will this help trim your budget a bit?

How much of a budget increase is necessary after trimming to get to the presentation you would like?

We can adjust it up some - just let me know your thoughts.



## Conversation Log

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July 6, 2009

Sara Wehrli Sent:

I guess the argument that I am trying to present in this project is that there are economically reasonable green substitutes out there that would be good for the multifamily housing industry. Therefore, I don't necessary want to remove the carpet from the budget because I believe this is a great product. Hence the angle I am trying to present is that there are green substitutes that can replace old when necessary. I obviously understand that it is not necessary to replace perfectly good carpet, however if it is going to be replaced this is a good substitute type of thing. For River Stone do you know how much they budgeted for the interior during construction? I removed all items that are not energy efficient and it brought the price down \$2,000. I can remove a new furnace and new cabinets and get the budget down to around \$5,000.

Sara E. Wehrli, NALP  
Graduate Assistant  
Ball State University  
Residential Property Management  
sewehrli@bsu.edu

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July 6, 2009

Chad Huntsman Sent:

ok - I am looking forward to reading the full project and putting all of the pieces together.

Let me know if there is anything I can do further to help you get it wrapped up.